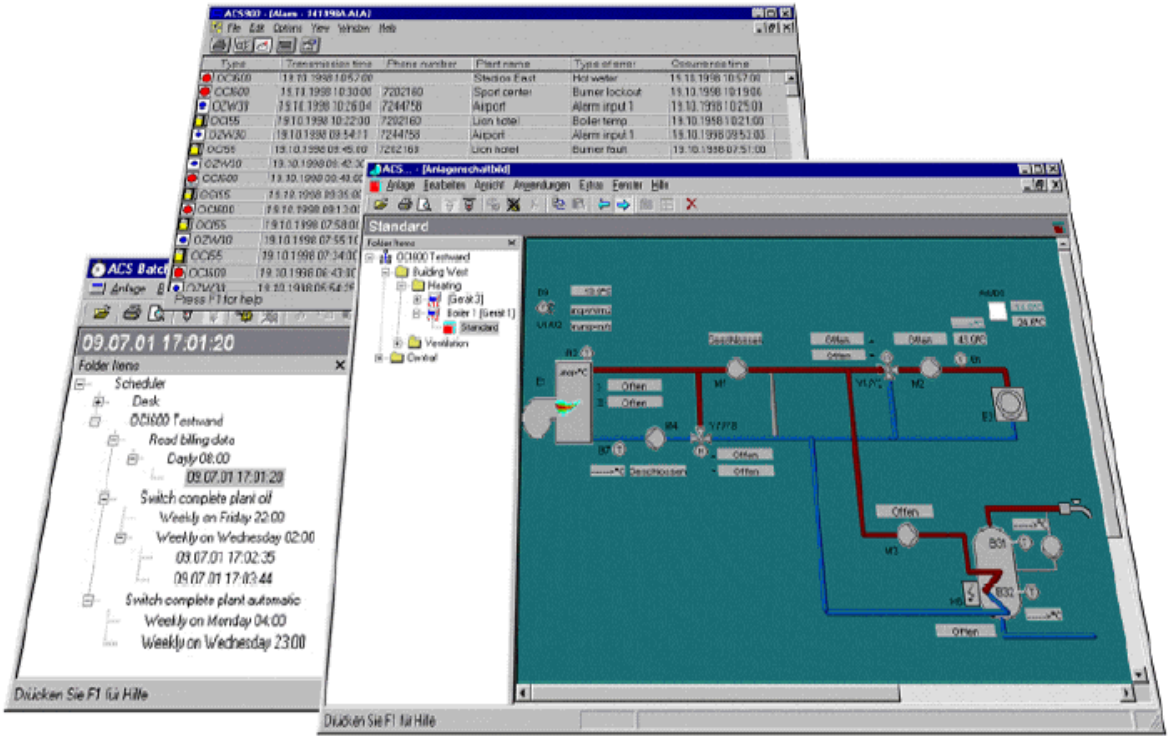
SIEMENS



M-bus System

Basic Documentation

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HVAC Products

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1 System

1.1 Introduction

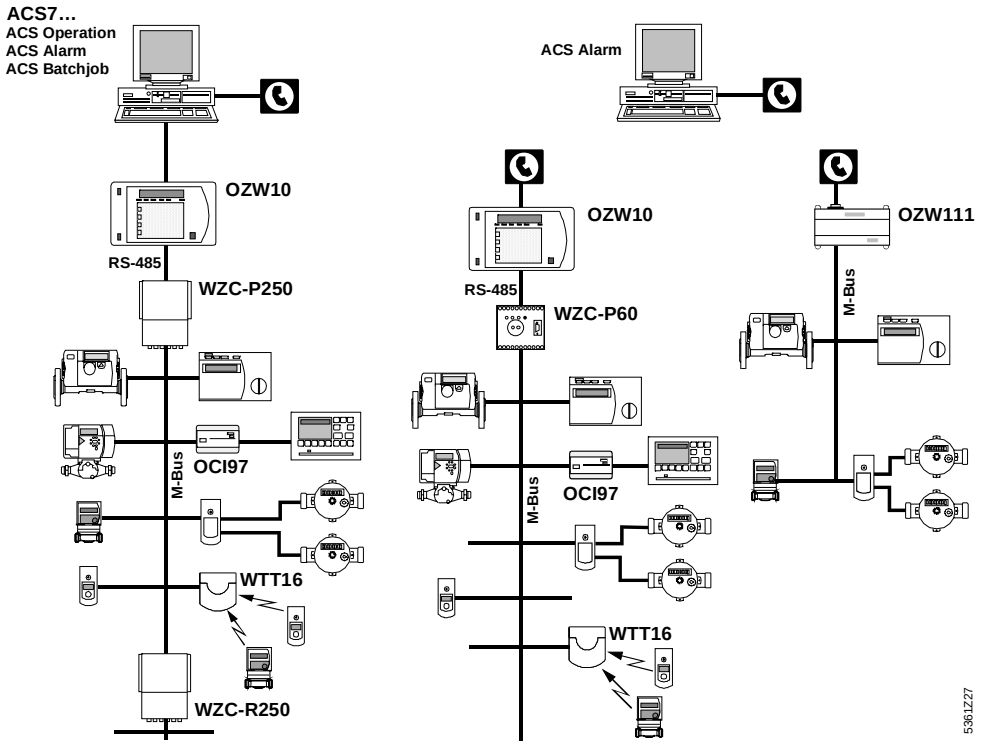
The M-bus system is used for the remote readout, remote operation and monitoring of consumption meters and controllers having an M-bus connection facility conforming to EN 1434-3 and of consumption meters of the Siemeca™ AMR system.
The present Basic Documentation contains basic information which is required for planning and operating the M-bus system. First, a description of the system itself, of the system functions and system applications is given. Then, information is provided about the functions of the PC software, of the M-bus central units and of the connected meters and controllers. Finally, all data required for engineering and for the communication between PC and M-bus central units are given.

1.2 System overview

The OZW10 or OZW111 is the central unit on the M-bus. It communicates with the consumption meters and controllers via M-bus:

- The OZW10 can be connected to a maximum of 750 M-bus devices and communicates with them via the RS-485 / M-bus signal converter WZC-P… With V4.0 or higher, consumption meters of the Siemeca™ AMR system can also be integrated via WTX16 or WTT16 radio nodes
- The OZW111 can be connected to a maximum of 5 M-bus devices and has an M-bus connection facility. Consumption meters of the Siemeca™ AMR system cannot be connected

The M-bus central units can be connected to a PC or the ACS7… plant operating software, either directly or via modem.



1.3 Use

The M-bus system is used for consumption cost billing and remote monitoring of
- community and district heating systems
- multifamily houses

Among other devices, the following types of units can be connected:

M-bus meters

- Heat meters SONOHEAT®, MEGATRON®2, SONOGYR® energy*, and SONOGYR® WSD…*
- Water meters VOLUTRON®2
- Consumption meters via pulse adapter AEW21.2, Relay PadpulsM1
- Electronic heat cost allocators MEMOTRON®2 WHE21*

M-bus controllers

- District heating controllers SIGMAGYR® RVD2… (OZW10 V3.0 or higher, and OZW111)
- District heating controllers SIGMAGYR® RVP97* (only with OZW10 of V3.0 or higher)

Siemeca™ AMR

- Consumption meters of the Siemeca™ AMR system can be integrated via WTX16 or WTT16 radio nodes (only with OZW10 of V4.0 or higher):
  - Heat meters MEGATRON®2
  - Water meters VOLUTRON®2
  - Heat cost allocators MEMOTRON®2 WHE26
  - Consumption meters via pulse adapter AEW36.2

* Product no longer available, but still supported

1.4 Functions

The M-bus system offers a high level of safety in terms of data transmission and standard functionality while requiring only a minimum effort for engineering when setting up the plant:
- Device identification via automatic search run
- Remote operation of plant with the PC, via modem or direct connection
- Acquisition of consumption data
- Remote readout of consumption data via memory card, via display on the M-bus central unit, or with the PC
- Remote readout and setting the parameters of the control devices
- Visualization of plant diagrams
- Logging and graphic presentation of processes (Trend)
- Identification of device faults and malfunctions
- Delivery of alarms to the display of the M-bus central unit via alarm relay and to a PC
- Status reports
- One-time or periodic execution of Batchjobs

1.5 Documentation

Product	*Type of documentation*	*Document no.*
M-bus System – Fundamentals	Data Sheet	N5361
Installation of Heating Plant in compliance with EMC Directives	Data Sheet	N2034
Plant Operating Software ACS7…	Basic Documentation	P5640*
	Installation Instructions	G5640
	User Manual	
	• ACS Operation ACS Service	U5640
	• ACS Alarm	U5641
	• ACS Batchjob	U5642
Plant Operating Software ACS700	Data Sheet	N5641
Plant Operating Software ACS712	Data Sheet	N5643
Plant Operating Software ACS713	Data Sheet	N5644
Plant Operating Software ACS715	Data Sheet	N5645
Plant Operating Software ACS741	Data Sheet	N5647
Plant Operating Software ACS785	Data Sheet	N5648
M-bus Central Unit OZW10	Data Sheet	N5362
	Mounting Instructions	M2841
	User Manual	U5362
	Popcards	B5362
M-bus Central Unit OZW111	Data Sheet	N5363
	Installation Instructions	G5363
M-bus Signal Converter WZC-P250	Data Sheet	N5365
	Mounting Instructions	M5364
M-bus Signal Converter WZC-P60	Data Sheet	N5382
M-bus Repeater WZC-R250	Data Sheet	N5366
	Mounting Instructions	M5364

2 System components

2.1 PC software ACS7…

2.1.1 Introduction

The ACS7… plant operating software is used for the remote operation and monitoring of M-bus plant. Also, the M-bus central units are commissioned with the help of the ACS7… plant operating software.

2.1.2 Use

The following versions of ACS7… are recommended for operating M-bus plant:

- ACS741: For the remote readout of meter consumption data
- ACS785: For the remote operation and monitoring of substations in district heating networks with controllers and meters and for the remote readout of meter consumption data

The ACS7… package contains the following software programs:

ACS Operation Software for the remote operation and monitoring of 1 or several plants equipped with an OZW10 or OZW111 M-bus central unit.

ACS Alarm Software for the reception of alarms and system reports from 1 or several central communication units OZW10 or OZW111.

ACS Batchjob Software for the automatic control and logging of plant data of 1 or several district heating plants with OZW10 or OZW111.

ACS Service Software for commissioning the OZW10 and OZW111 M-bus central units.

2.1.3 Functions of ACS Operation

Overview

The operating software provides a number of functions, depending on the type of selected software package.

Function	*Description*	*Type of software package*					
		ACS700	*ACS712*	*ACS713*	*ACS715*	*ACS741*	*ACS785*
Plant Diagram	Visualization and remote operation of data points with graphic display of plant						
• Standard	Predefined graph and data points of each device			●	●		●
• User-defined	Graph, data points and interconnections as defined by the user	●	●	●	●	●	●
Popcard	Visualization and remote operation of all transmitted data points of the connected devices						
• Standard	Predefined pages and data points of each device	●	●	●	●	●	●
• User-defined	Pages and data points as defined by the user	●	●	●	●	●	●
Trend	Acquisition and presentation of the dynamic behavior of selected data points						
• Online	With connection to the plant				●		●
• Offline	Without connection to the plant. The Offline Trend function is not provided by the OZW10 and OZW111. This function is not available with these central stations		●	●	●		●
File Transfer	Transmission and storage of files of the central units and memory cards. The OZW111 does not store any data, such as billing data. For this reason, this function is only provided by the OZW10			●	●	●	●
Parameter Settings	Uploading and editing the setting parameters of a device in tabular form	●	●	●	●	●	●
Commissioning Report	Logging the setting values of individual devices, device groups, or of the entire plant			●	●		●
Plant Navigation	Plant view in the form of a tree structure						
• Device view	The view corresponds to the addressing of the devices	●	●	●	●	●	●
• Plant view	The view is determined by the user			●	●		●
Connections	Type of connections						
• Direct	To the OZW10 and OZW111 via standard null modem cable	●	●	●	●	●	●
• Modem	Via telephone modems	●	●	●	●	●	●

The operating software contains applications with the following features:

- The following applications can be started several times and run at the same time:
  - Plant Diagram
  - Popcard
  - Online Trend
  - Offline Trend
  - File Transfer
  - Parameter Settings
  - Commissioning Report
- Several applications can be used simultaneously (e.g. Plant Diagram and Popcard)
- Active applications (e.g. Online Trend) can run in the background
- User-defined adaptations can be made in the following applications and views:
  - Plant Diagram
  - Popcard
  - Plant view

The software contains a device description for each supported device. The device descriptions define

- the data points with the assigned properties
- the links to the applications

An overview of the data the ACS can access in the relevant devices is given in section 8.6 "Data of M-bus devices available on ACS7… ".

Plant Diagram

This application permits the graphic presentation of plant (individual devices or groups of devices) with the following choices:

- Automatic updating of process values in the diagram
- Changing setpoints in the diagram
- In the case of user-defined diagrams, links to other diagrams can be established

A library with standard plant diagrams is assigned to each device type. For all supported plant diagrams, the library contains:

- The graphic presentation
- The data points to be displayed
- The text to be displayed

The application identifies the selected plant type, automatically assigns the standard plant diagram and shows the current values.

A user-defined plant diagram can be generated for each device:

- By adopting and adjusting the standard plant diagram
- By creating a new plant diagram

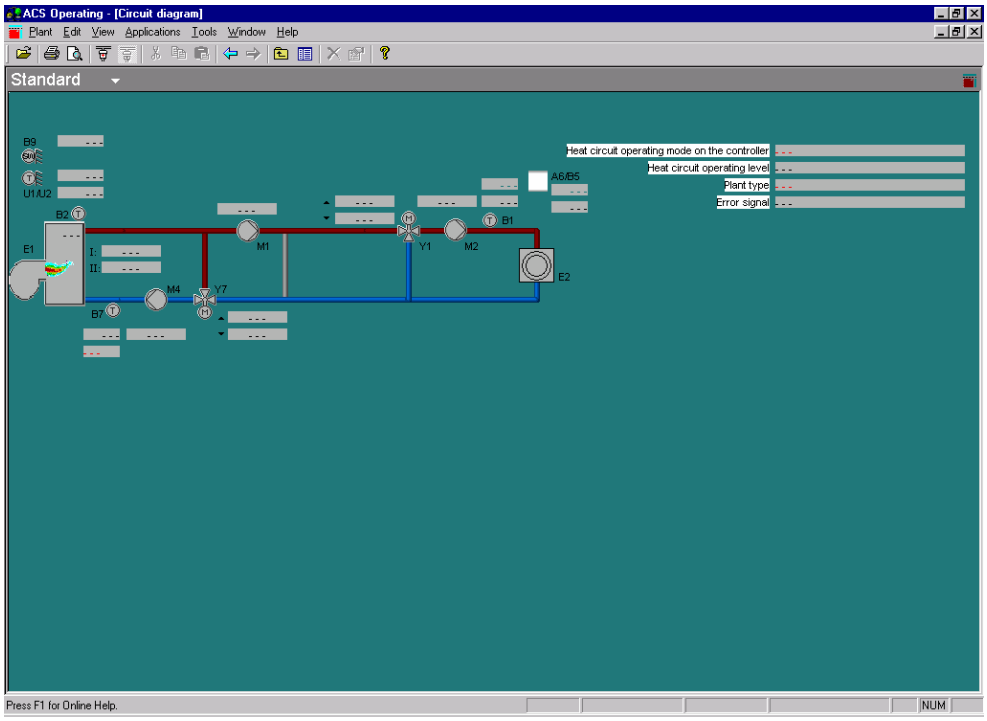
A user-defined plant diagram is created as follows:

- Use external graphic software (e.g. Micrografx Picture Publisher™) for the graphic presentation. The graphs can be adopted in Bitmap format
- For the inclusion of data points and links, the application has an Editor integrated

All user-defined plant diagrams will be stored in a separate library. They can also be created without having a connection to the plant (offline).

Switching between the standard and the user-defined plant diagram is possible at any time.

The plant diagrams can be printed out.



Popcard

This application is used to visualize the transmitted data points of each device and the data points‘ values.

Each type of device uses standard popcards. Makeup and contents of the individual pages are predefined.

User-defined popcards can be created for each device and each node. Data points of all subordinate devices can be added to popcards that are assigned to a node. Standard and user-defined popcards can be copied to devices of the same type or to superposed nodes.

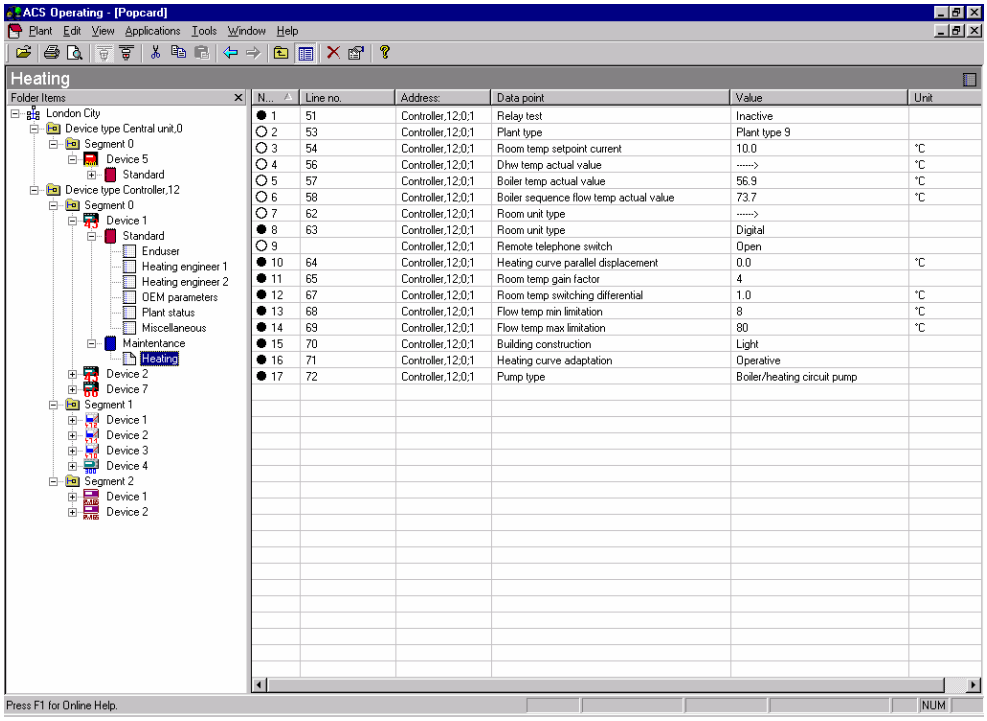
User-defined popcards offer the following features:

- They can consist of several user-defined pages
- Each page can be subdivided into several user-defined sections
- Freely selectable data points and separators can be assigned to the popcards, the pages and the sections

Switching between the standard and the user-defined popcards is possible at any time.

Each selected page is automatically updated. The updating process will be visualized.

The operating pages can be printed out and exported as an ASCII file.


ACS Operating - [Popcard]
Plant Edit View Applications Tools Window Help
Heating
Folder Items
London City
Device type Central unit,0
Segment 0
Device 5
Standard
Device type Controller,12
Segment 0
Device 1
Standard
Enduser
Heating engineer 1
Heating engineer 2
OEM parameters
Plant status
Miscellaneous
Maintentance
Heating
Device 2
Device 7
Segment 1
Device 1
Device 2
Device 3
Device 4
Segment 2
Device 1
Device 2
N... Line no. Address: Data point Value Unit
1 51 Controller,12;0;1 Relay test Inactive
2 53 Controller,12;0;1 Plant type Plant type 9
3 54 Controller,12;0;1 Room temp setpoint current 10.0 °C
4 56 Controller,12;0;1 Dhw temp actual value -----> °C
5 57 Controller,12;0;1 Boiler temp actual value 56.9 °C
6 58 Controller,12;0;1 Boiler sequence flow temp actual value 73.7 °C
7 62 Controller,12;0;1 Room unit type ----->
8 63 Controller,12;0;1 Room unit type Digital
9 Controller,12;0;1 Remote telephone switch Open
10 64 Controller,12;0;1 Heating curve parallel displacement 0.0 °C
11 65 Controller,12;0;1 Room temp gain factor 4
12 67 Controller,12;0;1 Room temp switching differential 1.0 °C
13 68 Controller,12;0;1 Flow temp min limitation 8 °C
14 69 Controller,12;0;1 Flow temp max limitation 80 °C
15 70 Controller,12;0;1 Building construction Light
16 71 Controller,12;0;1 Heating curve adaptation Operative
17 72 Controller,12;0;1 Pump type Boiler/heating circuit pump
Press F1 for Online Help.
NUM

Trend

This application allows any data points of a plant to be logged.

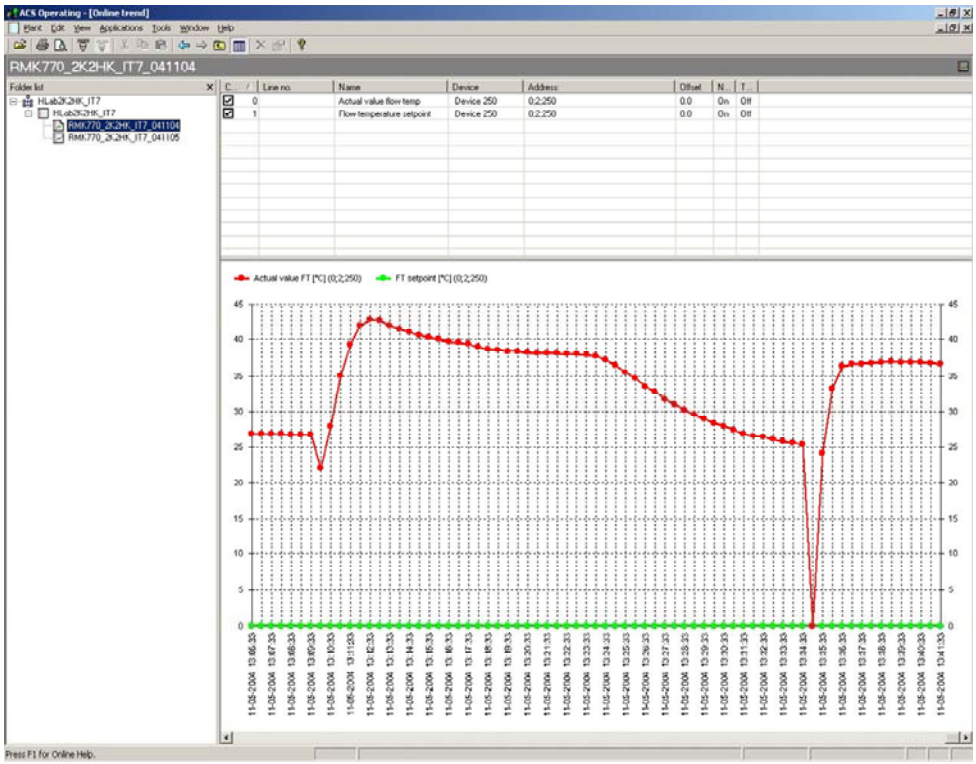
The description, the selected data points of all devices of a plant and the sample interval are defined in the trend definition. With online trend, it is also possible to select storage of the commissioning report at the start and end of the logging process. In offline trend, start and end of logging can be defined.

In trend logging, the cyclically queried data are stored and graphically presented. Earlier trend logging can be retrieved and presented again at any time.

With the OZW10 and OZW111, the Trend application is only available online:

- Online Trend: The connection between plant and PC is established. All acquired data are stored directly on the PC. The graphic presentation of trend logging takes place online
- Offline Trend: There is no connection between plant and PC. All acquired data will be downloaded and stored on the memory card in the central unit. The graphic presentation of logging is made after uploading

Trend logging can be printed out and exported as an ASCII file.



File Transfer

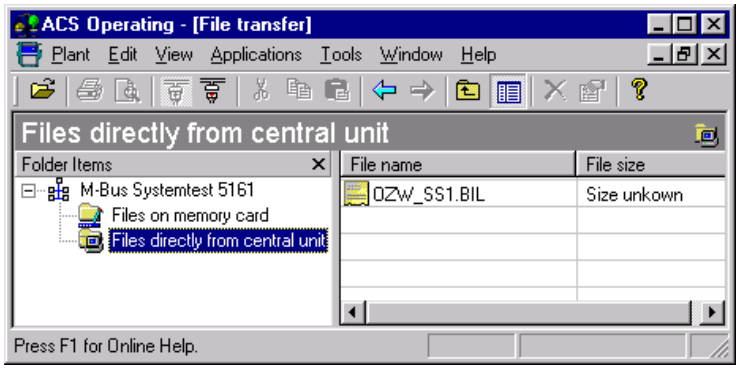
This application makes possible the exchange of data between the OZW10 and a PC in M-bus plant. It enables

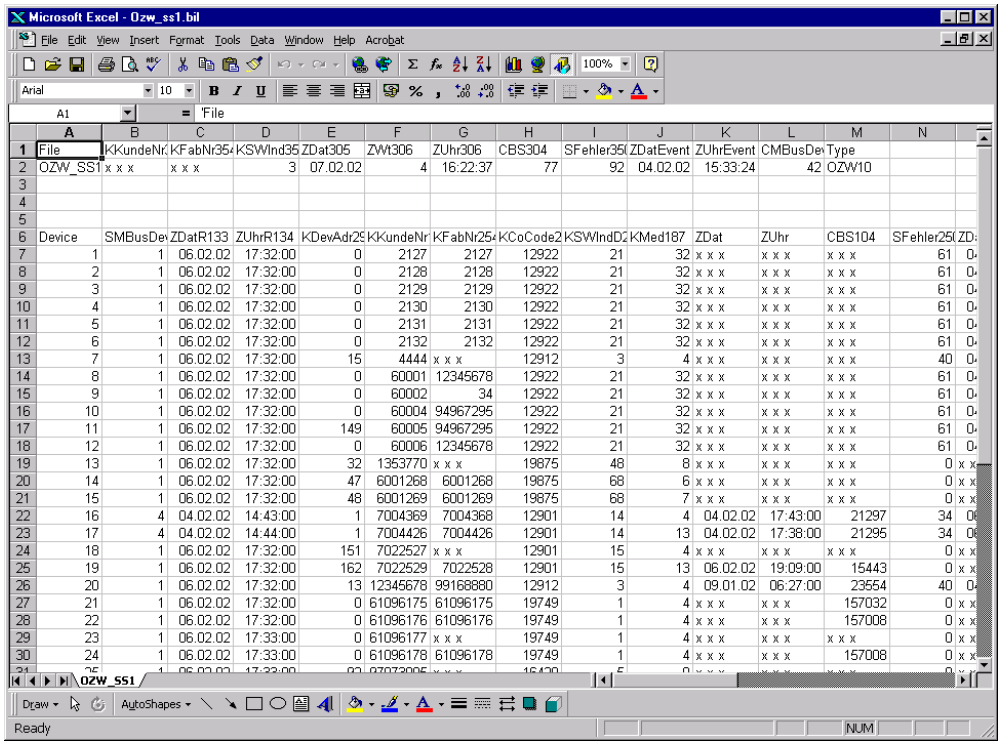
- files to be copied from the central unit or its memory card to the PC
- files to be copied from the PC to the central unit's memory card
- memory cards to be formatted

Typically, the function is used with the OZW10 to upload billing data from the central unit. For information about the data contained in a billing file, refer to subsection 8.5.5 "Data of M-bus devices stored in the billing file".

For visualizing the data, a selectable Editor suited for ASCII files can be started.

File transfer can be automated by making use of the Batchjob software.





The application is not available with the OZW111 since that central unit does not prepare billing data as a file. In plants equipped with the OZW111, the billing data can be individually uploaded with the help of the ACS Batchjob software.

Parameter Settings

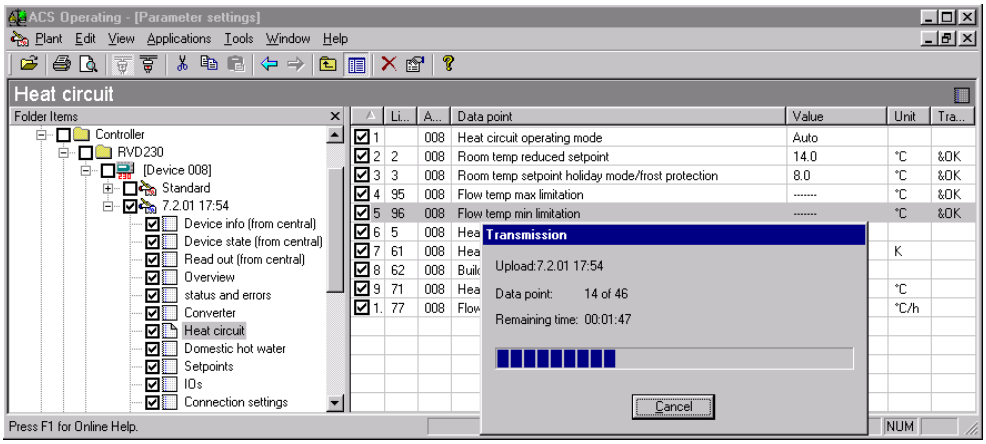
This application is used to downloaded, uploaded or compare the settings of the connected devices.

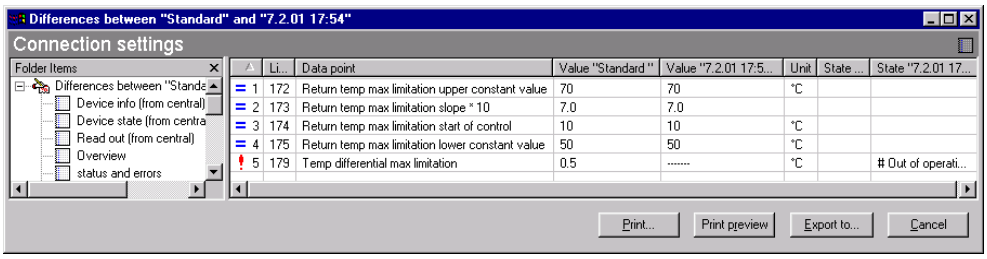
The settings can be

- stored as a parameter set
- compared with a stored parameter set
- compared with the standard parameter set
- overwritten with a stored parameter set
- overwritten with the parameter set

The parameter sets can be edited either online or offline. The individual data points of a parameter set can be selected. The transmission result of uploading, downloading or comparing is displayed online.

The parameter set can be printed out and exported as an ASCII file.



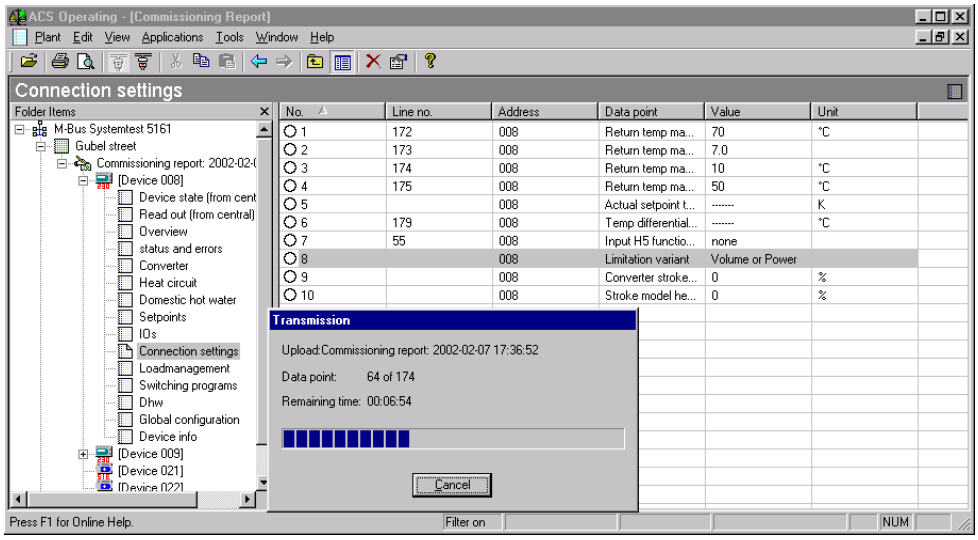


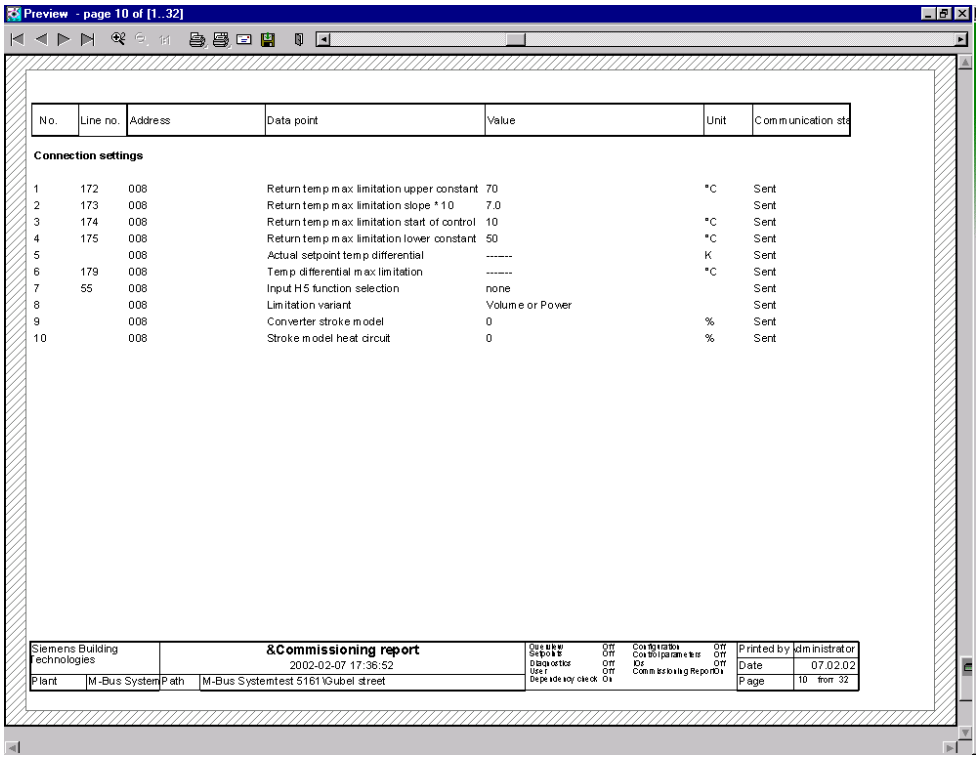
Commissioning Report

This application is used to log the setting values of individual devices, groups of selected devices or of entire plants.

The data points of the selected devices are stored with data point designation, value, unit and state.

The commissioning report can be printed out and exported as an ASCII file.




Preview - page 10 of [1..32]
No. Line no. Address Data point Value Unit Communication sta
Connection settings
1 172 008 Return temp max limitation upper constant 70 °C Sent
2 173 008 Return temp max limitation slope * 10 7.0 Sent
3 174 008 Return temp max limitation start of control 10 °C Sent
4 175 008 Return temp max limitation lower constant 50 °C Sent
5 008 Actual setpoint temp differential ------- K Sent
6 179 008 Temp differential max limitation ------- °C Sent
7 55 008 Input H5 function selection none Sent
8 008 Limitation variant Volume or Power Sent
9 008 Converter stroke model 0 % Sent
10 008 Stroke model heat circuit 0 % Sent
Siemens Building Technologies
&Commissioning report
2002-02-07 17:36:52
Plant M-Bus System
Path M-Bus Systemtest 5161\Gubel street
Printed by administrator
Date 07.02.02
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2.1.4 Functions of ACS Alarm

Overview

Alarm software is a superposed program contained in all types of software packages.

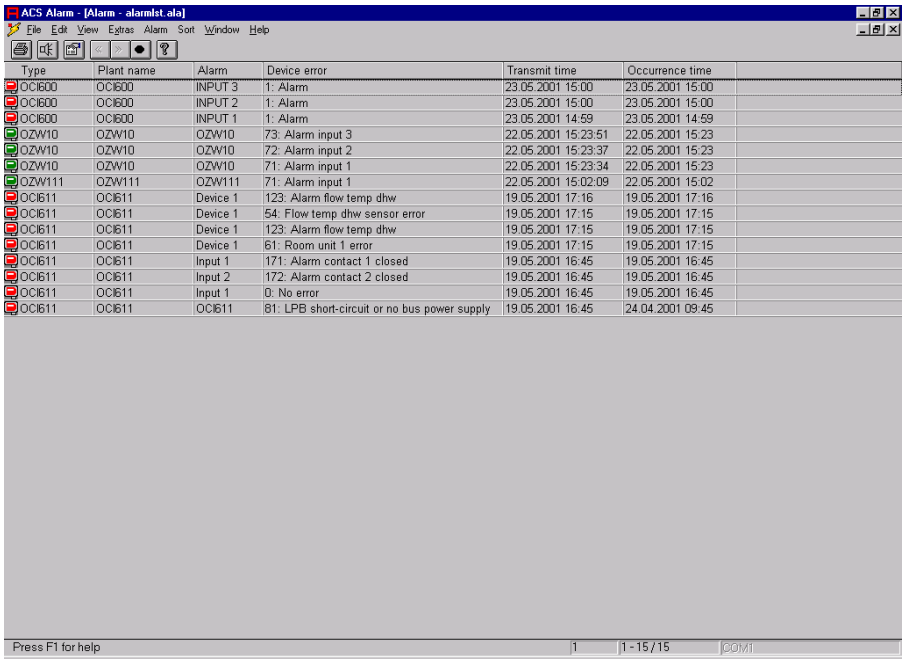
Function	*Description*
Alarm	Alarms from the central unit or the plant are received, stored, indicated and output on a printer
System Report	Information from the central unit or the plant is received, stored, indicated and output on a printer
Connections	Type of connections

Function	*Description*
• Direct	On the OZW10 and OZW111, with standard null modem cable
• Modem	Via telephone modems

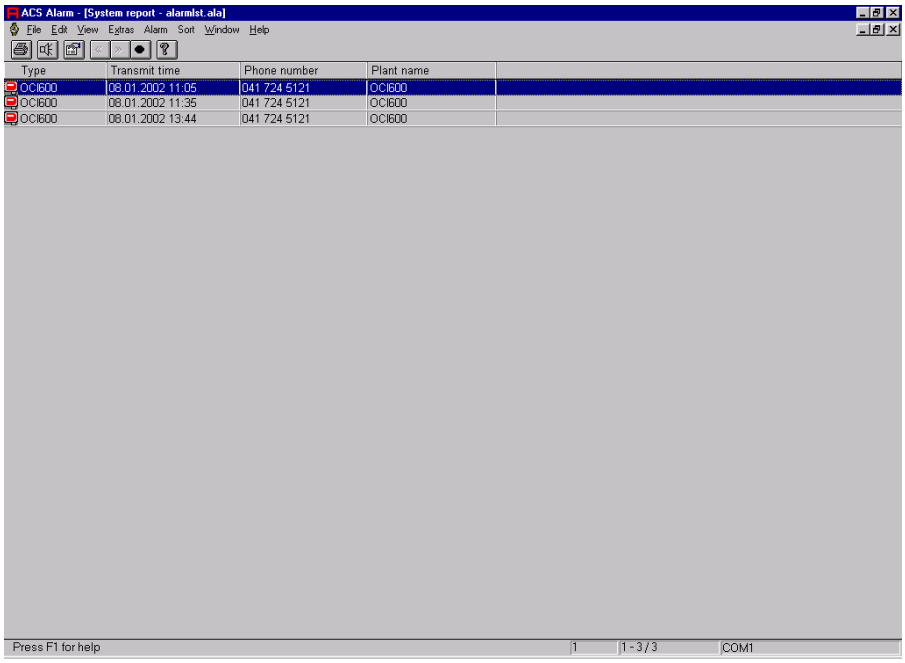
The alarm software contains the following applications for the reception and further handling of alarms and of the plant's state:

- Alarm
- System Report

Alarm



System Report

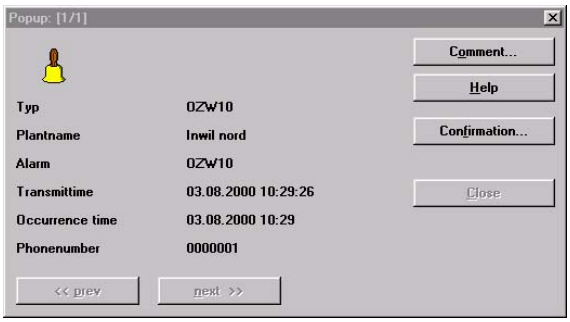

ACS Alarm - [System report - alarmlst.ala]
File Edit View Extras Alarm Sort Window Help
Type | Transmit time | Phone number | Plant name
OCI600 | 08.01.2002 11:05 | 041 724 5121 | OCI600
OCI600 | 08.01.2002 11:35 | 041 724 5121 | OCI600
OCI600 | 08.01.2002 13:44 | 041 724 5121 | OCI600
Press F1 for help
1
1 - 3 / 3
COM1

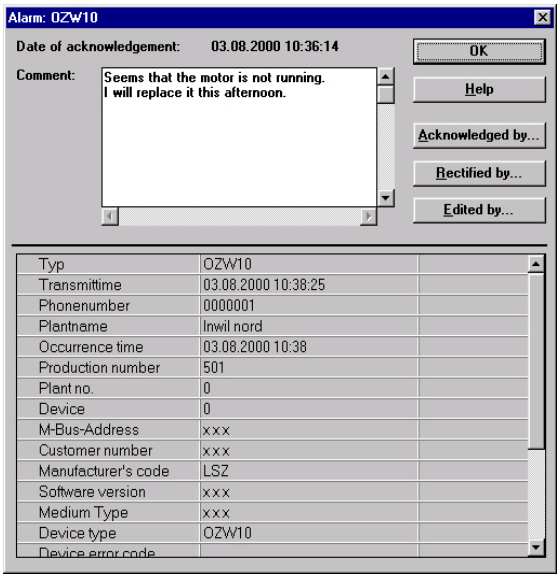
Alarm

Every alarm received from the plant is entered in an alarm list.
The process that takes place after reception of an alarm can be configured:

- Audible signal
- A popup window opens. The alarm is entered in the alarm list only when the window is closed
- Output on a printer
- Any combination of the 3 choices

The user can select the columns of the alarm list. The column designations and the arrangement of the individual columns can be configured on a user-specific basis.
The entire alarm list can be exported as an ASCII file. Also, to facilitate further handling in other programs, the alarms received are automatically exported to an ASCII file.
An overview of the possible alarms from the OZW10 and OZW111 is given in section 8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

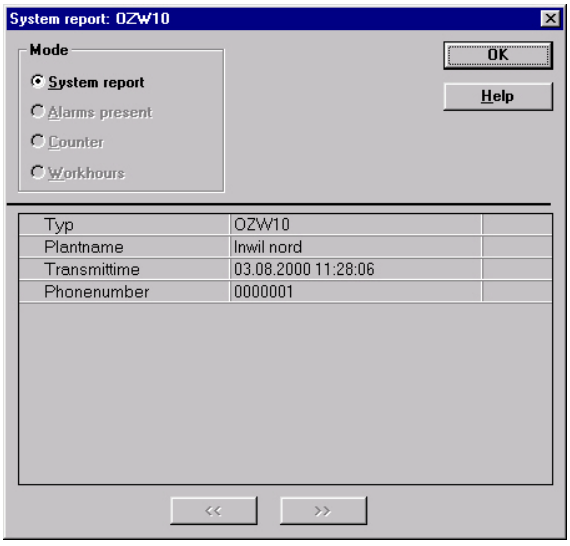




System Report

The system report is used to monitor plant operation.

It contains general information about the plant, such as type of central unit, phone number of the plant, and plant name.
The system report can be output on a local printer.



2.1.5 Functions of ACS Batchjob

Overview

The Batchjob software is a superposed program that is available depending on the type of selected software package.

Function	*Description*	*Software package*					
		ACS700	*ACS712*	*ACS713*	*ACS715*	*ACS741*	*ACS785*
Execution of Task	Monitoring of all planned tasks				●		●
Planning and Evaluation of Task	Definition, planning and evaluation of tasks				●		●
Logging of Task	Recording of results of execution of all planned tasks				●		●
Plant Navigation	View of plants in a tree structure				●		●
Connections	Type of connections						
• Direct	To the OZW10 and OZW111 with standard null modem cable				●		●
• Modem	Via telephone modems				●		●

The Batchjob software contains applications for automatic control and recording of plant data:

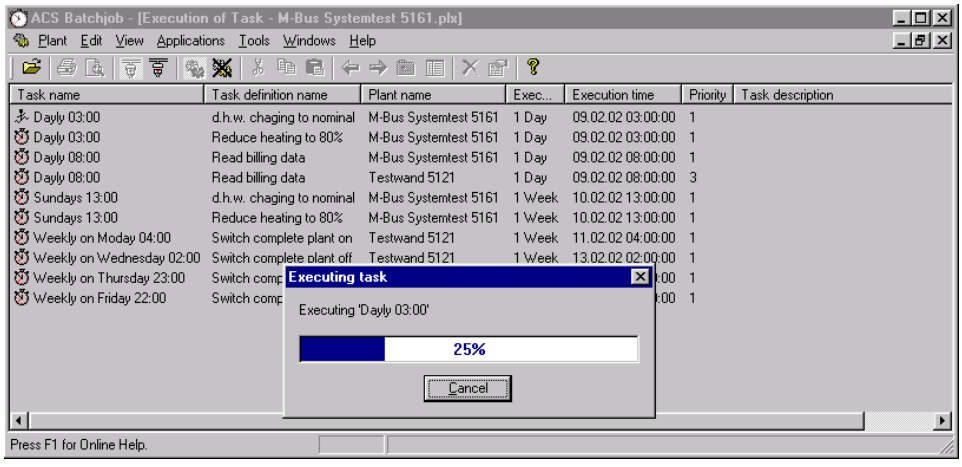
- Execution of Task
- Planning and Evaluation of Task
- Logging of Task

Execution of Task

Execution of task allows all plants to be monitored. The tasks can be executed on different types of plant. Tasks include one-time or periodic uploading and downloading of data points and uploading files.

The execution of tasks can be generally started or stopped. Individual tasks can be enabled or disabled. A task can immediately be executed.

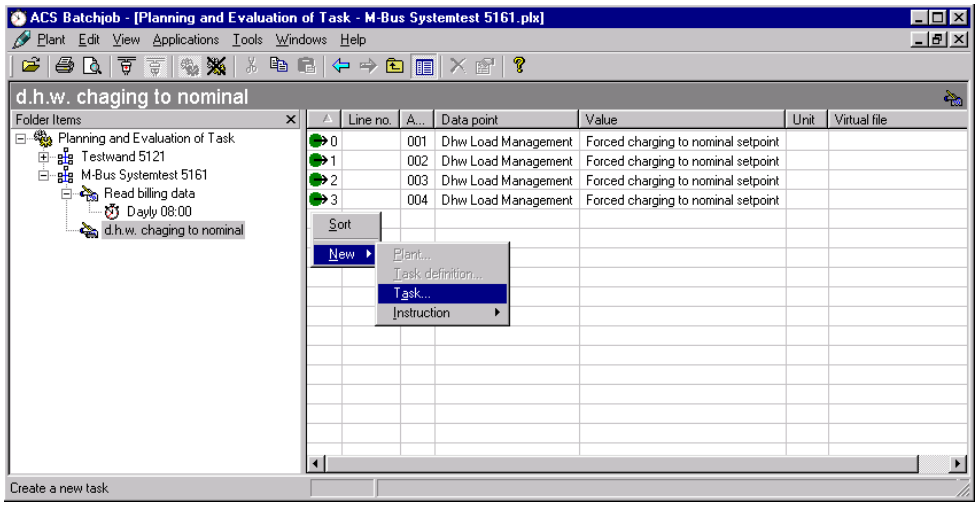
The task state and the result of the last execution are visualized with a symbol.

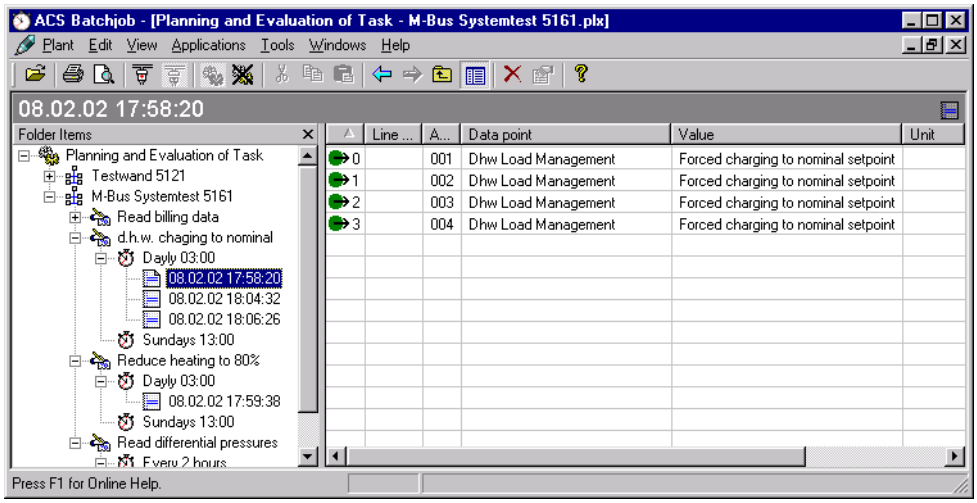

ACS Batchjob - [Execution of Task - M-Bus Systemtest 5161.plx]
Plant Edit View Applications Tools Windows Help
Task name | Task definition name | Plant name | Exec... | Execution time | Priority | Task description
Dayly 03:00 | d.h.w. chaging to nominal | M-Bus Systemtest 5161 | 1 Day | 09.02.02 03:00:00 | 1
Dayly 03:00 | Reduce heating to 80% | M-Bus Systemtest 5161 | 1 Day | 09.02.02 03:00:00 | 1
Dayly 08:00 | Read billing data | M-Bus Systemtest 5161 | 1 Day | 09.02.02 08:00:00 | 1
Dayly 08:00 | Read billing data | Testwand 5121 | 1 Day | 09.02.02 08:00:00 | 3
Sundays 13:00 | d.h.w. chaging to nominal | M-Bus Systemtest 5161 | 1 Week | 10.02.02 13:00:00 | 1
Sundays 13:00 | Reduce heating to 80% | M-Bus Systemtest 5161 | 1 Week | 10.02.02 13:00:00 | 1
Weekly on Moday 04:00 | Switch complete plant on | Testwand 5121 | 1 Week | 11.02.02 04:00:00 | 1
Weekly on Wednesday 02:00 | Switch complete plant off | Testwand 5121 | 1 Week | 13.02.02 02:00:00 | 1
Weekly on Thursday 23:00 | Switch comp
Weekly on Friday 22:00 | Switch comp
Executing task
Executing 'Dayly 03:00'
25%
Cancel
Press F1 for Online Help.

Planning and Evaluation of Task

This application is used for planning tasks and for their evaluation.

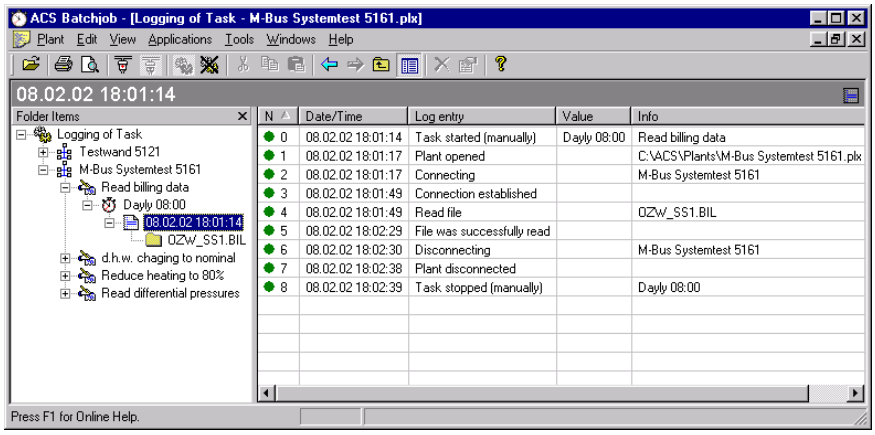
Planning and evaluation of a task comprises a description, the time of execution, and a number of instructions. Execution can take place once at a certain time, or periodically. Instructions include downloading and uploading data points and uploading files. The result of the task can automatically be exported.
A task is always confined to one plant.


ACS Batchjob - [Planning and Evaluation of Task - M-Bus Systemtest 5161.plx]
Plant Edit View Applications Tools Windows Help
d.h.w. chaging to nominal
Folder Items
Planning and Evaluation of Task
Testwand 5121
M-Bus Systemtest 5161
Read billing data
Dayly 08:00
d.h.w. chaging to nominal
Line no. A... Data point Value Unit Virtual file
0 001 Dhw Load Management Forced charging to nominal setpoint
1 002 Dhw Load Management Forced charging to nominal setpoint
2 003 Dhw Load Management Forced charging to nominal setpoint
3 004 Dhw Load Management Forced charging to nominal setpoint
Sort
New
Plant...
Task definition...
Task...
Instruction
Create a new task


ACS Batchjob - [Planning and Evaluation of Task - M-Bus Systemtest 5161.plx]
Plant Edit View Applications Tools Windows Help
08.02.02 17:58:20
Folder Items
Planning and Evaluation of Task
Testwand 5121
M-Bus Systemtest 5161
Read billing data
d.h.w. chaging to nominal
Dayly 03:00
08.02.02 17:58:20
08.02.02 18:04:32
08.02.02 18:06:26
Sundays 13:00
Reduce heating to 80%
Dayly 03:00
08.02.02 17:59:38
Sundays 13:00
Read differential pressures
Line ... A... Data point Value Unit
0 001 Dhw Load Management Forced charging to nominal setpoint
1 002 Dhw Load Management Forced charging to nominal setpoint
2 003 Dhw Load Management Forced charging to nominal setpoint
3 004 Dhw Load Management Forced charging to nominal setpoint
Press F1 for Online Help.

Logging of Task

This application logs the processes taking place when a task is executed. All tasks are included, irrespective of automatic or manual execution.


ACS Batchjob - [Logging of Task - M-Bus Systemtest 5161.plx]
Plant Edit View Applications Tools Windows Help
08.02.02 18:01:14
Folder Items
Logging of Task
Testwand 5121
M-Bus Systemtest 5161
Read billing data
Dayly 08:00
08.02.02 18:01:14
OZW_SS1.BIL
d.h.w. chaging to nominal
Reduce heating to 80%
Read differential pressures
N Date/Time Log entry Value Info
0 08.02.02 18:01:14 Task started (manually) Dayly 08:00 Read billing data
1 08.02.02 18:01:17 Plant opened C:\ACS\Plants\M-Bus Systemtest 5161.plx
2 08.02.02 18:01:17 Connecting M-Bus Systemtest 5161
3 08.02.02 18:01:49 Connection established
4 08.02.02 18:01:49 Read file OZW_SS1.BIL
5 08.02.02 18:02:29 File was successfully read
6 08.02.02 18:02:30 Disconnecting M-Bus Systemtest 5161
7 08.02.02 18:02:38 Plant disconnected
8 08.02.02 18:02:39 Task stopped (manually) Dayly 08:00
Press F1 for Online Help.

2.1.6 Functions of ACS Service

The ACS service software has a fixed functionality and is included in all software packages.

Function	*Description*
Popcard	Visualization and remote operation of all data points transmitted by the connected devices
• Standard	Pages and data points predefined for each device
• User-defined	Pages and data points as defined by the user
Online Trend	Acquisition and presentation of dynamic behavior of selected data points, with connection to the plant
Parameter Settings	Uploading and editing the setting parameters of a device in tabular form
Commissioning Report	Logging the setting values of individual devices, device groups, or of the entire plant
Plant Navigation	View of plant as a tree structure. The makeup of the tree structure corresponds to device addressing
Connection	Directly to the OZW10 or OZW111 via standard modem cable

For a detailed description of the applications, refer to subsection 2.1.3 "Functions of ACS Operation".

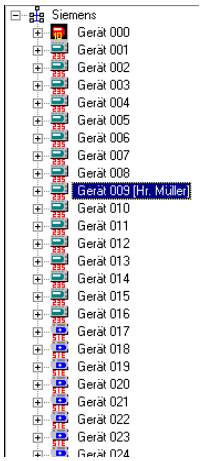
2.1.7 Plant navigation

To facilitate plant navigation, the plant is presented in the form of a tree structure. This view is supported by the following applications:

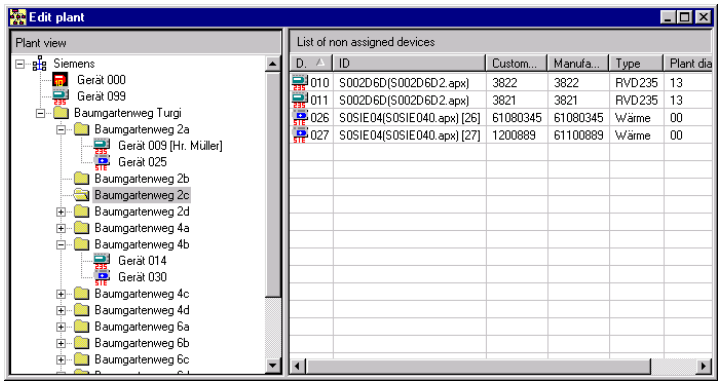
- Plant Diagram
- Popcard
- Online Trend
- Offline Trend
- Parameter Settings
- Commissioning Report
- Planning and Evaluation of Task
- Logging of Task

The following views can be selected:

- Device view
- Plant view



Device view



Generation of “Plant view”

The device view shows the plant in accordance with device addressing.

In the plant view, the tree structure can be defined on a user-specific basis. The tree structure is defined by including nodes. The devices can be assigned to the nodes as required.

- Switching between device view and plant view is possible at any time. A description can be added to each device and each node
- The plant view in the form of a tree structure can either be shown or hidden

2.1.8 Communication

For detailed information about the communication between ACS… and OZW…, refer to section 6.1 "Communication between ACS7… and OZW…".

Direct connection

The direct connection necessitates a standard null modem cable between M-bus central unit and PC.

Telephone connection

When using the connection via the telephone network, a Hayes-compatible modem is required on each side.

2.1.9 Equipment combinations

Functions in connection with the central units

The functions described in sections

- 2.1.3 "Functions of ACS Operation"
- 2.1.4 "Functions of ACS Alarm"
- 2.1.5 "Functions of ACS Batchjob"
- 2.1.6 "Functions of ACS Service"

depend on the type of central unit and the service interface used:

Function	*Type of central unit / service interface*								
	OZW771	*OCI600*	*OCI611*	*OZW10* [3]	*OZW111*	*OZW30*	*OCI55*	*OCI69*	*OCI700*
Plant Diagram	●	●	●	●	●			●	●
Popcard	●	●	●	●	●			●	●
Trend									
• Online	●	●	●	●	●			●	●
• Offline		●							
File Transfer		●		●					
Parameter Settings	●	●	●	●	●			●	●
Commissioning Report	●	●	●	●	●			●	●
Plant Navigation	●	●	●	●	●			●	●
Alarm	●	●	●	●	●	●	●		
System Report	●	●	●	●	●	●	●		
Execution of Task	●	●	●	●	●			●	●
Planning and Evaluation of Task	●	●	●	●	●			●	●
Logging of Task	●	●	●	●	●			●	●
Connections									
• Direct	● 1)	● 1)	● 1)	● 1)	● 1)	● 1)	● 1)	● 1)	● 2)
• Modem	●	●	●	●	●	●	●		

1) With standard null modem cable
2) With standard USB cable (connector type A to B)
3) V3.0 or higher

For more information about the central units, refer to sections 2.2 "M-bus central unit OZW10" and 2.3 "M-bus central unit OZW111".

Number of plants

The number of plants is unlimited for all programs (ACS Operation, ACS Alarm, ACS Batchjob and ACS Service). In the ACS programs, a plant is created for each central unit.

Functions in connection with M-bus devices

In the ACS7… programs, data of all types of M-bus devices can be displayed and downloaded. The data originate either directly from the M-bus device or from the central unit, depending on the type of central unit used:

- The OZW10 uploads certain data of the M-bus devices cyclically and stores them. In the case of plants equipped with the OZW10, the data can either be uploaded directly from the M-bus device or from the memory of the central unit using the ACS… The kind of data stored in the OZW10 depends on the type of M-bus device. An overview is given in subsection 2.2.5 "Equipment combinations"
- The OZW111 does not store any data from the M-bus devices. ACS7… always uploads the data ("transparently") from the M-bus device

For the kind of data of the respective M-bus device available on ACS7…, refer to section 8.6 "Data of M-bus devices available on ACS7… ".

Number of devices per plant

With the operating software and the Batchjob software, the number of devices per plant are limited. By contrast, with the alarm software and the service software, the number of devices are unlimited. For limiting the number of devices, a credit is defined for each standard package. Every connected device of the plant charges this credit with a device-specific value. The number of devices that can be served is limited by the credit amount available. Additional credits can be ordered separately:

Software	*Credit per software package*					
	ACS700	*ACS712*	*ACS713*	*ACS715*	*ACS741*	*ACS785*
Operating software	200	200	200	200	1300	3900
Batchjob software				200		3900

Type of product	*Device-specific credit*
OCI600, OCI611, OZW10, OZW111, OZW771, OZW775	10
OCI69, OCI700, WTX16, WTT16, KNX line coupler	0
Synco™ RMU7…, RMH7…, RMB7…, RMK7…, RMS7…	8
Synco™ RLU2…, SEZ2…	8
Synco™ RXB…*	2
Synco™ QAW740	1
SIGMAGYR® RVL…, RVP…, RVD…	8
SONOHEAT®, SONOGYR®	3
Siemeca™ WF.21…, WF.26…	2
Siemeca™ WHE21…, WHE36	1
Siemeca™ AEW21.2 and AEW36.2 per input	1
PadpulsM1	1
Third-party device with own Device Description	8
Unknown device without own Device Description	8

* only RXB… with KNX logo

PC hardware

PC component	*Minimum requirement*
Processor	Pentium-compatible 300 MHz, recommended 600 MHz
RAM	128 MB, recommended 256 MB
Hard disk	1.9 GB free memory (Windows XP) 2.0 GB with 1.0 GB free memory (Windows 2000) Recommended: additional 20 MB free memory per plant
Screen	VGA standard driver 800 × 600, 256 colors Recommended: SVGA standard driver 1028 × 768

PC component	*Minimum requirement*
Ports	USB 1.1 and higher Serial COM up to 19,200 Baud (directly or via modem)
Operating system	Windows XP, service pack 1 Windows 2000, service pack 3
Diskette drive	3½", 1.44 MB, for diskette with log file
CD-ROM or DVD drive	

PC software

To further handle exported data, a user program, such as Microsoft® Excel, is required. It must be suited for ASCII files

- that consist of several lines and columns, and
- whose columns are separated by tabs

Modems

Modems are required if communication takes place via the telephone network. The drivers of the modems installed under Windows can be used.

2.1.10 Dongle

The dongle is the same as that used with DESIGO® Insight. Each dongle carries a serial number.

Copy protection	*Type reference*
USB dongle	**CMD.02**

Standard packages are supplied complete. If required, they contain the CMD.02 dongle and the license file (diskette). The license is required to enable the functions in the individual software programs.
The following standard packages are available:

Type reference	*Dongle CMD.02*
ACS700	–
ACS712	Contained
ACS713	Contained
ACS715	Contained
ACS741	Contained
ACS785	Contained

Extra packages are available for extending the functions of the standard packages. Based on the ACS700 standard package, a CMD.02 dongle is required. For more information about the extra packages, refer to Data Sheet N5640 (ACS7…).

2.2 M-bus central unit OZW10

2.2.1 Introduction

The M-bus central unit is used for the remote readout, remote operation and monitoring of M-bus plant with consumption meters and controllers having an M-bus connection facility conforming to EN 1434-3 and of consumption meters of the Siemeca™ AMR system.

2.2.2 Use

The M-bus central unit is designed for consumption cost billing and remote monitoring of district heat systems and multifamily houses.
Among other devices, the following types of M-bus devices can be connected:

M-bus meters

- Heat meters SONOHEAT®, MEGATRON®2, SONOGYR® energy*, SONOGYR® WSD…*

- Consumption meters via pulse adapter AEW21.2, Relay PadpulsM1
- Heat cost allocators MEMOTRON®2 WHE2*

M-bus controllers

- District heating controllers SIGMAGYR® RVD2…
- District heating controllers RVP97*

Siemeca™ AMR

Consumption meters of the Siemeca™ AMR system can be integrated via WTX16 or WTT16 radio nodes (V4.0 or higher):

- Heat meters MEGATRON®2
- Water meters VOLUTRON®2
- Heat cost allocators MEMOTRON®2 WHE26
- Consumption meters via pulse adapter AEW36.2

Other devices on request.

* Product no longer available, but still supported

2.2.3 Functions

The M-bus central unit

- identifies connected M-bus and Siemeca™ AMR devices with the help of its automatic search run: For detailed information, refer to section 8.3 “Search run of central units OZW10 and OZW111".
- acquires and stores the consumption data of the M-bus and Siemeca™ AMR devices at regular intervals
- displays the stored consumption data
- copies the stored consumption data to a billing file of the memory card at the press of a button
- makes possible to access
  - stored consumption data
  - the memory card
  - directly the M-bus devices by means of a PC connected either directly or via modem (V3.0 or higher)
- monitors periodically the M-bus and Siemeca™ AMR devices and 4 potential-free digital inputs
- indicates alarms
  - on the display
  - via alarm relay
  - to a PC, either directly or via modem (V3.0 or higher)

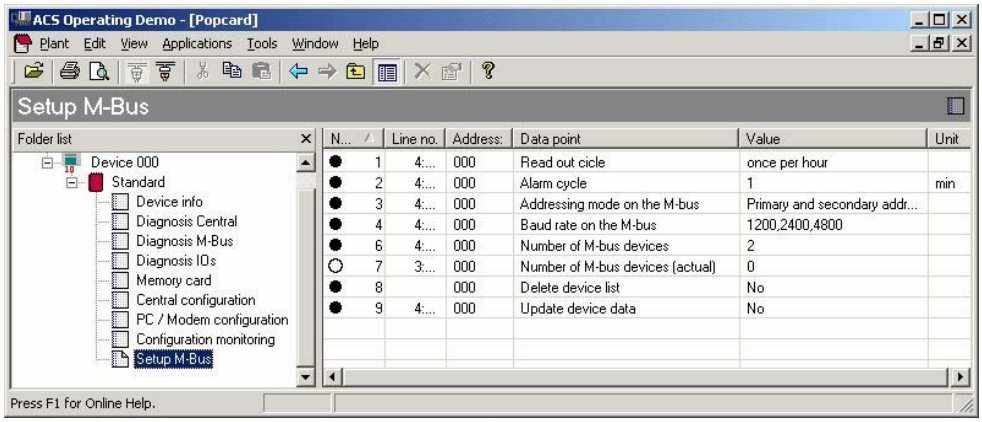
Parameter settings

The M-bus central unit can be parameterized in 2 different ways:

- Via the buttons of the M-bus central unit
- With a PC, connected directly or via modem, with the help of the ACS service software (only directly) or the ACS operating software (directly or via modem)

Setup

On request, the M-bus central unit automatically searches for the M-bus and Siemeca™ AMR devices used by the system. Supported are primary and secondary addressing (*type of addressing on the M-bus*) and the Baud rates 300, 2,400 and 9,600 Baud (*Baud rates on the M-bus)*. The type of addressing and the Baud rates can be selected.


ACS Operating Demo - [Popcard]
Plant Edit View Applications Tools Window Help
Setup M-Bus
Folder list
Device 000
Standard
Device info
Diagnosis Central
Diagnosis M-Bus
Diagnosis IOs
Memory card
Central configuration
PC / Modem configuration
Configuration monitoring
Setup M-Bus
N... Line no. Address: Data point Value Unit
1 4:... 000 Read out cicle once per hour
2 4:... 000 Alarm cycle 1 min
3 4:... 000 Addressing mode on the M-bus Primary and secondary addr...
4 4:... 000 Baud rate on the M-bus 1200,2400,4800
6 4:... 000 Number of M-bus devices 2
7 3:... 000 Number of M-bus devices (actual) 0
8 000 Delete device list No
9 4:... 000 Update device data No
Press F1 for Online Help.

The device list is stored in nonvolatile memory.
For detailed information about the search run, refer to section 8.3 "Search run of central units OZW10 and OZW111".

Readout

The M-bus central unit offers a number of choices for reading the M-bus and Siemeca™ AMR devices. It must be appropriately parameterized:

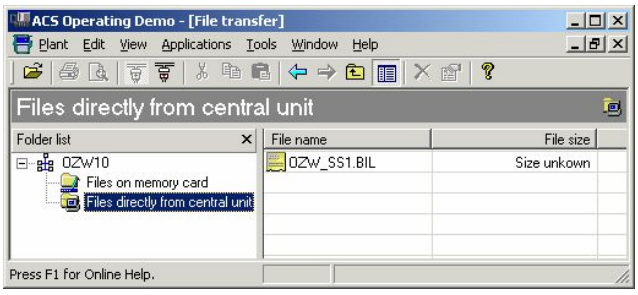
- *Readout cycle* with manual querying: The data are read out via M-bus only when requested
- *Readout cycle* with periodic querying: The data are periodically and automatically read out – hourly, daily, weekly or monthly. It should be noted however that in the case of battery-powered M-bus devices, frequent readout can shorten the batteries' life, depending on the type of device (e.g. SONOGYR® and MEGATRON®, but not SONOHEAT® 2WR4 and 2WR5). If such devices are used by the system, no more than 1 reading per day is normally permitted. For details, refer to the specification of the relevant product
- *Alarm cycle* (V3.0 or higher): For monitoring, controllers can be queried more frequently. The alarm cycle can be set at increments of minutes

All data known to the M-bus central unit are stored in an internal process image and prepared for further handling. Siemeca™ AMR devices send their data periodically to the radio nodes WTX16 or WTT16. The OZW10 uploads the data stored in the radio nodes.

Evaluating the consumption data

The M-bus central unit stores the data of all M-bus and Siemeca™ AMR devices last read. They can be read out at the M-bus central unit. To handle them on a PC, the data can be transferred as follows:

- The data are made available via the RS-232 port as a billing file. They can then be read out with the help of the ACS7… PC software, either directly or via modem


ACS Operating Demo - [File transfer]
Plant Edit View Applications Tools Window Help
Files directly from central unit
Folder list
File name File size
OZW10
Files on memory card
Files directly from central unit
OZW_SS1.BIL Size unkown
Press F1 for Online Help.

- The data are transferred to a memory card in the form of a billing file. The M-bus central unit has a slot to insert the memory card. The memory card is forwarded to the billing agency, which loads the data directly to the PC via the RS-232 port using a second M-bus central unit OZW10 and the ACS7… PC software

For a description of the billing file, refer to section 8.5 "Billing file".

Digital inputs

The M-bus central unit has 4 digital inputs for the connection of potential-free contacts. When a contact closes, the M-bus central unit indicates an alarm.

Alarms

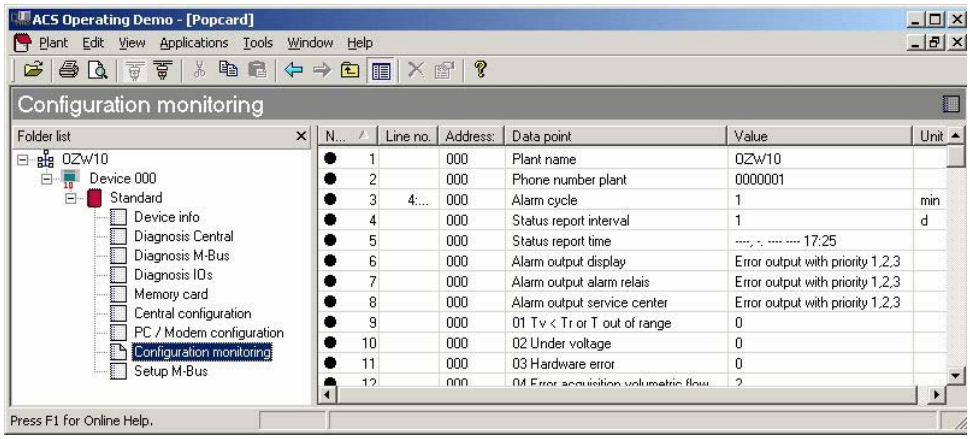
The M-bus central unit identifies the following types of faults:

- Signals at the digital inputs: Immediate delivery of alarm messages
- Failures of M-bus and Siemeca™ AMR devices: Cyclic readout of data by the central unit, depending on the setting made (refer to "Readout": Readout interval, alarm interval). Failure of a device is signaled as an alarm only after the central unit has failed to make a readout
- Error messages from the M-bus and Siemeca™ AMR devices: Since the M-bus is a single master slave bus, the devices cannot by themselves send the fault status messages to the central unit. Therefore, the central unit needs to cyclically query the devices one by one. This query is made during readout, depending on the setting made (refer to "Readout": Readout interval, alarm interval). A fault detected at a device is signaled as an alarm only after the central unit has completed its readout.

  Siemeca™ AMR devices send their data periodically to the radio nodes WTX16 or WTT16. Only when the faults have been transmitted to the radio node can they be read out by the M-bus central unit via radio node
- Faulty memory card, insufficient battery voltage, etc.: Immediate delivery of alarms
- Device error of the M-bus central unit: Immediate delivery of alarms
- A description of all faults that can be detected by the M-bus central unit is given in section 8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

The faults can be weighted and assigned to the following types of output devices:

- Indication of alarms
- Alarm relay
- PC with alarm software "ACS Alarm"


ACS Operating Demo - [Popcard]
Plant Edit View Applications Tools Window Help
Configuration monitoring
Folder list
OZW10
Device 000
Standard
Device info
Diagnosis Central
Diagnosis M-Bus
Diagnosis IOs
Memory card
Central configuration
PC / Modem configuration
Configuration monitoring
Setup M-Bus
N... Line no. Address: Data point Value Unit
1 000 Plant name OZW10
2 000 Phone number plant 0000001
3 4:... 000 Alarm cycle 1 min
4 000 Status report interval 1 d
5 000 Status report time ----, -. ---- ---- 17:25
6 000 Alarm output display Error output with priority 1,2,3
7 000 Alarm output alarm relais Error output with priority 1,2,3
8 000 Alarm output service center Error output with priority 1,2,3
9 000 01 Tv < Tr or T out of range 0
10 000 02 Under voltage 0
11 000 03 Hardware error 0
Press F1 for Online Help.

Each error code of the central unit can be assigned a priority (e.g. error code "01 Tv<Tr or T outside value range" of the central unit in the above example has priority 0 as the standard setting). Errors having priority 0 are not passed on to any output device. Errors having priority 1 through 3 are passed on to the output devices, depending on the setting made.

A description of all faults that can be detected by the M-bus central unit is given in section 8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

Faults that have occurred are displayed by the OZW… until rectified and acknowledged. Acknowledgement is made by pressing the buttons or by routing the alarm to the PC.

Rectification of faults is not signaled to the control center.

2.2.4 Communication

For detailed information about communication between ACS… and OZW…, refer to section 6.1 "Communication between ACS7… and OZW…".

Direct connection

In the case of a direct connection, a standard null modem cable is required between M-bus central unit and PC.

Telephone connection

In the case of a connection via the telephone network, a Hayes-compatible modem is required on each side.

2.2.5 Equipment combinations

Signal converter

The M-bus central unit has an RS-485 port. To be able to connect the central unit to the M-bus devices, an external signal converter is required. It must be connected to the RS-485 port of the central unit:

- WZC-P250 (Data Sheet N5365) for 250 M-bus devices, can be combined with repeaters WZC-R250 (Data Sheet N5366), or
- WZC-P60 (Data Sheet N5382) for a maximum of 60 M-bus devices (V3.0 or higher)

Type of device	*Maximum number*	*Type reference*	*Data Sheet*
M-bus central unit	1	**OZW10**	N5362
M-bus signal converter for a maximum of 250 devices, **or**	1	**WZC-P250**	N5365
M-bus signal converter for a maximum of 60 devices	1	**WZC-P60**	N5382
M-bus repeater for a maximum of 250 devices	Unlimited [1)]	**WZC-R250**	N5366
M-bus devices	750 [2)]		

1) In combination with the WZC-P250. For more information, refer to chapter 5 "Engineering"
2) The number of M-bus devices in dependent on the number of device types connected. For information about calculation, refer to chapter 5 "Engineering"

For more information about the signal converters, refer to sections 2.4 "M-bus signal converter WZC-P250" and 2.5 "M-bus signal converter WZC-P60".

Functions in connection with M-bus devices

The M-bus central unit reads certain data cyclically from the connected M-bus and Siemeca™ AMR devices and stores them until the next readout is made. Depending on the type of device, the OZW10 makes other data available. A description of these data is given in section 8.5 "Billing file".

Accessories

If readout of the consumption data is not made via RS-232 port or modem, it can also be made via memory card:

Type of memory card	*Type reference*
Memory card 128 KB	**ALC30.128**
Memory card 512 KB	**ALC30.512**

The M-bus central unit is operated on site with the help of the **ARG10.DE** operating set, which consists of:

Type of document	*Document no.*
Operating Manual	U5362
Popcards	B5362

2.2.6 Spare parts

For upgrading the OZW10, the most recent software version can be ordered as a separate item:

Product	*Part number*
Program memory OZW10	**74 340 0002 0**

It is always the most recent version that is supplied. When ordering the above part number, 16 pairs of OTP will be supplied. Smaller quantities cannot unfortunately be provided.

To change the OTPs, proceed as follows:

1. Save the billing file.
2. Open the OZW10 (screw on the front of the unit at bottom right).
3. Disconnect power supply to the OZW10 (terminal strip on the right).
4. Remove the OTPs (labeling: OZW10 Vx.y date A/B) with a suitable tool (pair of IC or PLCC pliers).
5. Fit the new OTPs: A on the right, B on the left.
   Ensure that the beveled edge of the OTPs is at top right.
6. Connect power supply again.
7. Acknowledge error message "Error 12" by pressing the button.

Check if the plant is still stored in the list. If not, recreate the device list (page 4, line 47).

2.3 M-bus central unit OZW111

2.3.1 Introduction

The M-bus central unit is used for the remote readout, remote operation and monitoring of M-bus plant with a maximum of 5 consumption meters and controllers having an M-bus connection facility conforming to EN 1434-3.

2.3.2 Use

The M-bus central unit is designed for remote monitoring of district heating systems and for consumption cost billing in multifamily houses.
Among others, the following types of M-bus devices can be connected:

M-bus meters

- Heat meters SONOHEAT®, MEGATRON®2, SONOGYR® energy*, SONOGYR® WSD…*
- Consumption meters via pulse adapter AEW21.2, Relay PadpulsM1
- Heat cost allocators MEMOTRON®2 WHE21*

M-bus controllers

- District heating controllers SIGMAGYR® RVD2…

Not supported are the following types of devices:

- District heating controllers SIGMAGYR® RVP97
- Consumption meters of the Siemeca™ AMR system

Other M-bus devices on request.

* Product no longer available, but still supported

2.3.3 Functions

The M-bus central unit

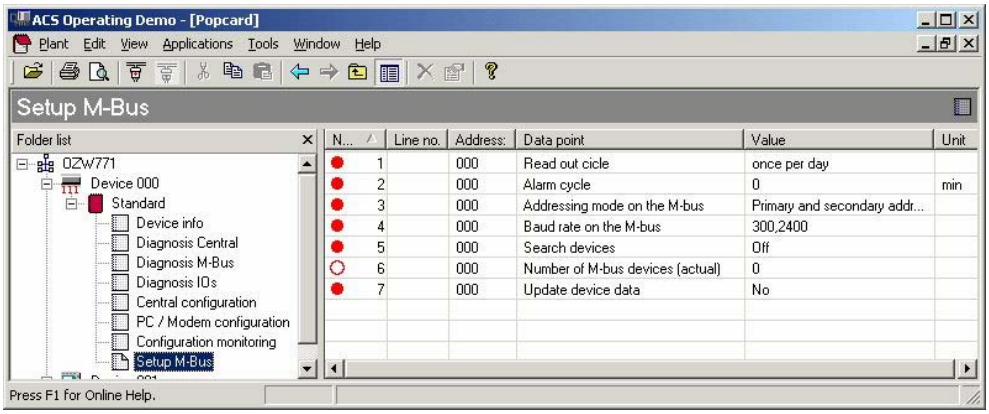
- identifies the connected M-bus devices via its automatic search run (for detailed information, refer to section 8.3 "Search run of central units OZW10 and OZW111")
- makes possible the direct access to the M-bus devices via a PC, connected either directly or via modem
- monitors periodically the M-bus devices and 2 potential-free digital inputs
- delivers alarms to a PC, either directly or via modem
- provides a clock function for alarms

Parameter settings

The parameters of the M-bus central unit are set with the help of a PC, connected either directly or via modem and using ACS Service (only directly) or ACS Operation (directly or via modem).

Acquisition of M-bus devices

Upon request, the M-bus central unit automatically searches for the M-bus devices used by the system. Supported are primary and secondary addressing (*type of addressing on the M-bus*) and Baud rates of 300 and 2,400 (*Baud rates on the M-bus*). The type of addressing and the Baud rate can be selected:


ACS Operating Demo - [Popcard]
Plant Edit View Applications Tools Window Help
Setup M-Bus
Folder list
OZW771
Device 000
Standard
Device info
Diagnosis Central
Diagnosis M-Bus
Diagnosis IOs
Central configuration
PC / Modem configuration
Configuration monitoring
Setup M-Bus
N... Line no. Address: Data point Value Unit
1 000 Read out cicle once per day
2 000 Alarm cycle 0 min
3 000 Addressing mode on the M-bus Primary and secondary addr...
4 000 Baud rate on the M-bus 300,2400
5 000 Search devices Off
6 000 Number of M-bus devices (actual) 0
7 000 Update device data No
Press F1 for Online Help.

The device list is stored in nonvolatile memory.
Detailed information about the search run is given in section 8.3 "Search run of central units OZW10 and OZW111".

Querying the M-bus devices

The M-bus central unit offers a number of choices for querying the M-bus devices:

- *Readout cycle* with manual querying: The data are queried via M-bus only when requested
- *Readout cycle* with periodic querying: To ensure monitoring of the devices, the data are periodically and automatically queried – hourly, daily, weekly or monthly. It should be noted however that in the case of battery-powered M-bus devices, frequent readout can shorten the batteries' life, depending on the type of device (e.g. SONOGYR® and MEGATRON®, but not SONOHEAT® 2WR4 and 2WR5). If such devices are used by the system, no more than 1 reading per day is normally permitted. For details, refer to the specification of the relevant product
- *Alarm cycle*: For monitoring, controllers can be queried more frequently. The alarm cycle can be set at increments of minutes

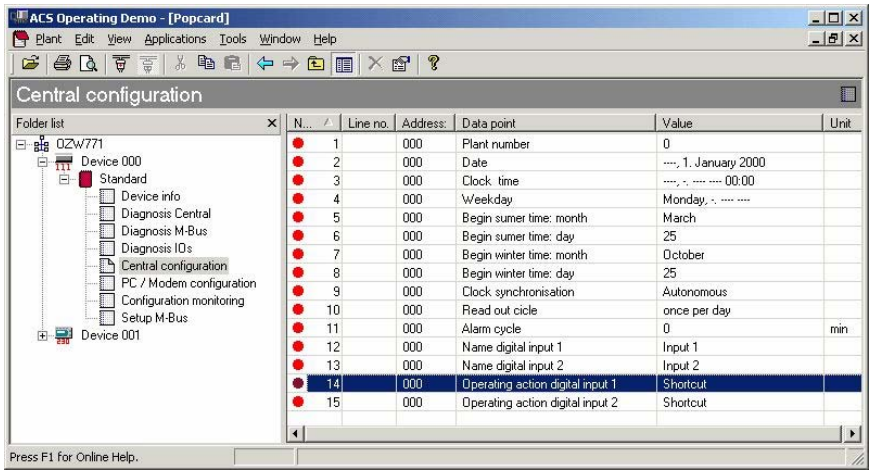
Evaluating consumption data

The data are made available via the RS-232 port, where they can be read out with the help of the appropriate PC software, either directly or via modem. More information about the available data is given in section 8.6 "Data of M-bus devices available on ACS7… ".
If a billing file is required,

- the data can be cyclically read out with the help of ACS Batchjob and stored in a file
- the OZW10 M-bus central unit can be used

Digital inputs

The M-bus central unit has 2 digital inputs for the connection of potential-free contacts. The operating action of the contacts (active closed or active open) can be parameterized.


ACS Operating Demo - [Popcard]
Plant Edit View Applications Tools Window Help
Central configuration
Folder list
OZW771
Device 000
Standard
Device info
Diagnosis Central
Diagnosis M-Bus
Diagnosis IOs
Central configuration
PC / Modem configuration
Configuration monitoring
Setup M-Bus
Device 001
N... Line no. Address: Data point Value Unit
1 000 Plant number 0
2 000 Date ----, 1. January 2000
3 000 Clock time ----, -. ---- ---- 00:00
4 000 Weekday Monday, -. ---- ----
5 000 Begin sumer time: month March
6 000 Begin sumer time: day 25
7 000 Begin winter time: month October
8 000 Begin winter time: day 25
9 000 Clock synchronisation Autonomous
10 000 Read out cicle once per day
11 000 Alarm cycle 0 min
12 000 Name digital input 1 Input 1
13 000 Name digital input 2 Input 2
14 000 Operating action digital input 1 Shortcut
15 000 Operating action digital input 2 Shortcut
Press F1 for Online Help.

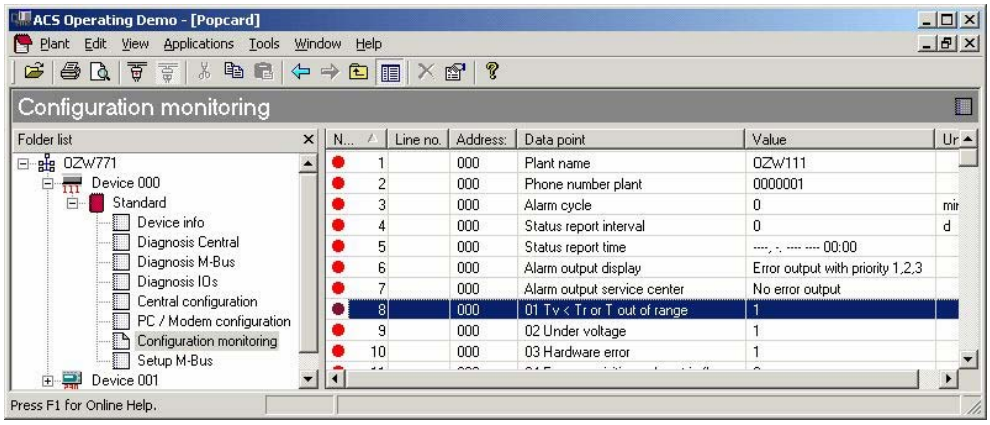
Alarms

The M-bus central unit can detect the following types of fault:

- Messages delivered to the digital inputs: Immediate delivery of alarms
- Failures of M-bus devices: Cyclic readout of device data by the central unit, depending on the setting made (refer to "Readout": Readout interval, alarm interval). Failure of an M-bus device is signaled as an alarm only after the central unit has failed to make a readout
- Error messages from the M-bus devices: Since the M-bus is a single master slave bus, the M-bus devices cannot by themselves send the fault status messages to the central unit. Therefore, the central unit needs to cyclically query the devices one by one. This query is made during readout, depending on the setting made (refer to "Readout": readout interval, alarm interval).
  A fault detected at an M-bus device is signaled as an alarm only after the central unit has completed its readout
- Device error of the M-bus central unit: Immediate delivery of alarms

The faults can be weighted and assigned to the following types of output devices:

- Alarm LED
- PC with alarm software "ACS Alarm"


ACS Operating Demo - [Popcard]
Plant Edit View Applications Tools Window Help
Configuration monitoring
Folder list
OZW771
Device 000
Standard
Device info
Diagnosis Central
Diagnosis M-Bus
Diagnosis IOs
Central configuration
PC / Modem configuration
Configuration monitoring
Setup M-Bus
Device 001
N... Line no. Address: Data point Value
1 000 Plant name OZW111
2 000 Phone number plant 0000001
3 000 Alarm cycle 0
4 000 Status report interval 0
5 000 Status report time ----, -. ---- ---- 00:00
6 000 Alarm output display Error output with priority 1,2,3
7 000 Alarm output service center No error output
8 000 01 Tv < Tr or T out of range 1
9 000 02 Under voltage 1
10 000 03 Hardware error 1
Press F1 for Online Help.

Each error code of the central unit can be assigned a priority (e.g. error code "01 Tv<Tr or T outside value range" of the central unit in the above example has priority 0 as the standard setting). Errors having priority 0 are not passed on to any output device. Errors having priority 1 through 3 are passed on to the output devices, depending on the setting made.

A description of all faults that can be detected by the M-bus central unit is given in section 8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

Rectification of a fault is not signaled to the control center.

2.3.4 Communication

For detailed information about the communication between ACS… and OZW…, refer to section 6.1 "Communication between ACS7… and OZW…".

Direct connection

In the case of a direct connection, a null modem is required between M-bus central unit and PC.

Telephone connection

In the case of a connection via the telephone network, a Hayes-compatible modem is required on each side.

2.3.5 Equipment combinations

The OZW111 has its M-bus power supply integrated and requires no additional M-bus signal converter. A maximum of 5 M-bus devices can be connected to the M-bus central unit.

M-bus mini plant	*Maximum number*	*Type reference*	*Data Sheet*
M-bus central unit	1	**OZW111**	N5363
M-bus devices	5*		

Note

* The SONOHEAT® heat meters with an M-bus module up to V1.06 produce a bus load of 1.5 standard loads. For this reason, this type of meter produces a load of 1.5 M-bus devices on the M-bus. Hence, a maximum of 5/1.5 = 3 SONOHEAT® heat meters with an M-bus module up to V1.06 can be connected to an OZW111.
  All other devices and SONOHEAT® heat meters with an M-bus module of V2.01 or higher represent 1 M-bus standard load.

2.4 M-bus signal converter WZC-P250

2.4.1 Introduction

The M-bus signal converter converts RS-485 signals to M-bus signals.

2.4.2 Use

The M-bus signal converter serves for the connection of an M-bus central unit with an RS-485 port to the M-bus.

2.4.3 Functions

The M-bus signal converter
- converts the RS-485 signals to M-bus signals
- operates as a bus driver.

2.4.4 Equipment combinations

The M-bus signal converter is for connection to the RS-485 port of the OZW10 (refer to section 2.2 "M-bus central unit OZW10").

A maximum of 250 M-bus devices can be connected to the M-bus signal converter.

M-bus segment	*Maximum number*	*Type reference*	*Data Sheet*
M-bus signal converter for a maximum of 250 devices	1	**WZC-P250**	N5365
M-bus devices	250*		

Note

* The SONOHEAT® heat meters with an M-bus module up to V1.06 produce a bus load of 1.5 standard loads. For this reason, this type of meter produces a load of 1.5 M-bus devices on the M-bus. Hence, a maximum of 250/1.5 = 166 SONOHEAT® heat meters with an M-bus module up to V1.06 can be connected to a WZC-P250.
All other devices and SONOHEAT® heat meters with an M-bus module of V2.01 or higher represent 1 M-bus standard load.

2.5 M-bus signal converter WZC-P60

2.5.1 Introduction

The M-bus signal converter converts RS-485 signals to M-bus signals.

2.5.2 Use

The M-bus signal converter serves for the connection of an M-bus central unit with an RS-485 port to the M-bus.

2.5.3 Functions

The M-bus signal converter
- converts RS-485, RS-232 or optical signals to M-bus signals
- operates as a bus driver

2.5.4 Equipment combinations

In the M-bus system, the M-bus signal converter is for connection to the RS-485 port of the M-bus central unit.
A maximum of 60 M-bus devices can be connected to the converter.

M-bus segment	*Maximum number*	*Type reference*	*Data Sheet*
M-bus signal converter for max. 60 devices	1	**WZC-P60**	N5382
M-bus devices	60*		

Note

* The SONOHEAT® heat meters with an M-bus module of V1.06 or higher produce a bus load of 1.5 standard loads. A SONOHEAT® heat meter with an M-bus module up to V1.06 corresponds to 1.5 devices: This means that a maximum of 60/1.5 = 40 SONOHEAT® heat meters with an M-bus module up to V1.06 can be connected to a WZC-P60.
All other devices and SONOHEAT® heat meters with an M-bus module of V2.01 or higher represent 1 M-bus load.

2.6 M-bus repeater WZC-R250

2.6.1 Introduction

The M-bus repeater is an amplifier for use in M-bus plants where long bus distances must be covered.

2.6.2 Use

The M-bus repeater is for use in plants where extensive bus lines are required, or where a large number of devices need to be connected, e.g. in district heating plants that supply heat to entire sections of towns.

2.6.3 Functions

The M-bus repeater
- operates as a signal amplifier
- enables plant to be subdivided into several M-bus sections

2.6.4 Equipment combinations

Through the use of M-bus repeaters (connected in series or in parallel), the plant can be subdivided into several M-bus segments.
A maximum of 250 M-bus devices can be connected to the M-bus repeater.

M-bus segment	*Maximum number*	*Type reference*	*Data Sheet*
M-bus repeater for maximum 250 devices	1 [1)]	**WZC-P250**	N5366
M-bus devices	250 [2)]		

1) This limitation applies to the M-bus output (master)

Note

2) The SONOHEAT® heat meters with an M-bus module of V1.06 or higher produce a bus load of 1.5 standard loads. A SONOHEAT® heat meter with an M-bus module up to V1.06 corresponds to 1.5 devices: This means that a maximum of 250/1.5 = 1660 SONOHEAT® heat meters with an M-bus module up to V1.06 can be connected to a WZC-P60.
All other devices and SONOHEAT® heat meters with an M-bus module of V2.01 or higher represent 1 M-bus load.

3 M-bus devices and Siemeca™ AMR

3.1 Controllers with M-bus

3.1.1 Introduction

In district heating systems, the substations for remote operation and monitoring are interconnected across long distances. For that purpose, the

- district heating controllers SIGMAGYR® RVD2…
- district heating controllers SIGMAGYR® RVP97 (via OCI97 bus interface)

are equipped with an M-bus interface. This enables the district heating controllers to be used with any type of M-bus meters on the same bus.

Detailed information about the individual controllers is given in the relevant pieces of documentation:

Type reference	*Data Sheet*	*Basic Documentation*
RVD230	N2383	P2383
RVD240	N2384	P2384
RVP97*	N2406	P2406
OCI97*	N2901	–

* Product no longer available, but still supported

3.1.2 Use

The table below shows the use of the district heating controllers in the M-bus system:

Type of controller	*M-bus connection facility*	*Control function*	
		Precontrol	*Heat distribution heating circuit, DHW*
RVD23…	M-bus connection facility integrated in the controller	Primary controller for district heat substations with interconnected system (plant types 5–x, 6–x, 7–2)	Controller for district heat substation with heating circuit and DHW heating (plant types 0–x, 1–x, 2–x, 3–x, 8–4)
RVD24…	M-bus connection facility integrated in the controller		Controller for district heat substation with 2 heating circuits and DHW heating (all plant types 1–x, 2–x, 3–x, 4–x)
RVP97	Integrated via bus interface OCI97		Controller for district heat substation with heating circuit and DHW heating

3.1.3 Functions

Detailed information about the functions of the individual controllers is given in the relevant pieces of documentation.

The district heating controllers make possible remote operation and monitoring of all key data via the M-bus interface. The operating software "ACS Operation" has the data grouped in accordance with its use. The grouping corresponds to the makeup of the popcards.

Popcards RVD2…

No	*Data group (operating page)*	*Description*
1	Overview	Overview of the plant's state (faults, limitations, operating state, process data, setpoints, actual values, etc.)
2	Status and errors	Operating modes, fault indication, indication of limitations
3	Converter	Overview of the setting parameters, plant state, setpoints and actual values related to the primary control loop (converter)
4	Heating circuit 1	Overview of the setting parameters, plant state, setpoints and actual values related to heating circuit 1
5	Heating circuit 2 (RVD24…)	Overview of the setting parameters, plant state, setpoints and actual values related to heating circuit 2
6	DHW	Overview of the setting parameters, plant state, setpoints and actual values related to DHW heating
7	Setpoints	Overview of all plant and setting values
8	IOs	Overview of all input and output signals
9	Connection conditions	Overview of all district heat-specific settings and limit values
10	Load management	Parameter for influencing the space and DHW heating load
11	Switching programs (RVD23…) Time program 1 (RVD24…)	Settings for the switching program of heating circuit 1
12	Time program 2 (RVD24…)	Settings for the switching program of heating circuit 2
13	Time program DHW	Settings for the switching program for DHW heating or for the circulating pump
14	Global configuration	Overview of the configuration parameters
15	Device identification	Device-specific information

For more information, refer to the following sections:
8.6 "Data of M-bus devices available on ACS7… "
8.5.5 "Data of M-bus devices stored in the billing file"
8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

Popcards RVP97

No	*Data group (operating page)*	*Description*
1	Overview	Overview of the plant's state (faults, limitations, operating state, process data, setpoints, actual values, etc.)
2	Status and errors	Operating modes, fault indication, indication of limitations
3	Precontrol	Overview of the setting parameters, plant state, setpoints and actual values related to the primary control loop
4	Heating circuit 1	Overview of the setting parameters, plant state, setpoints and actual values related to heating circuit 1

No	*Data group (operating page)*	*Description*
5	Heating circuit 2	Overview of the setting parameters, plant state, setpoints and actual values related to heating circuit 2
6	DHW	Overview of the setting parameters, plant state, setpoints and actual values related to DHW heating
7	Setpoints	Overview of all plant values and setpoints
8	IOs	Overview of all input and output signals
9	Connection conditions	Overview of all district heat-specific settings and limit values
11	Switching programs heating circuit 1	Settings for the switching program of heating circuit 1
12	Switching programs heating circuit 2	Settings for the switching program of heating circuit 2
13	Global configuration	Overview of the configuration parameters
14	Device info	Device-specific information

For more information, refer to the following sections:
8.6 "Data of M-bus devices available on ACS7… "
8.5.5 "Data of M-bus devices stored in the billing file"
8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

3.1.4 Equipment combinations

Within an M-bus system, the district heating controllers can be arbitrarily interconnected or connected to other M-bus-compatible devices.
Only the district heating controllers RVD2… of V2.1 or higher can be used in M-bus systems. RVD2… of versions lower than 2.1 do not ensure trouble-free operation on the M-bus and, for this reason, may only be used in special circumstances. Additional information is provided on request.

3.2 M-bus meters

3.2.1 Introduction

For electronic consumption cost billing, the majority of the heat, cold and hot water meters are equipped with an M-bus port conforming to EN 1434-3. Other types of consumption meters (e.g. gas meters or electricity meters) can be connected to the M-bus with the help of pulse adapters.
Detailed information about the individual meters and pulse adapters is given in the relevant pieces of documentation:

Type Reference	*Product family*	*Data Sheet*	*Basic Documentation*
2WR5	SONOHEAT®		
2WR4*	SONOHEAT®		
WSF…*	SONOGYR® energy	N5610	P5601
WSG…*	SONOGYR® energy	N5617	
WSJ…*	SONOGYR® energy	N5614	
WSD…*	SONOGYR®	N5371…5381*	P5370*
WFM21…	MEGATRON®2	N5333	
WFN21…	MEGATRON®2	N5338	
WFQ21…	MEGATRON®2	N5333	
WFR21…	MEGATRON®2	N5338	

Type Reference	*Product family*	*Data Sheet*	*Basic Documentation*
WFH21…	VOLUTRON®2	N5341	
WFC21…	VOLUTRON®2	N5341	
WHE21*	MEMOTRON®2	N5351	
AEW21.2	Pulse adapter WHZ.S0 Pulse converter	N5367 N2867	

* Product no longer available, but still supported

3.2.2 Use

The meters are used for consumption cost billing in district heat systems and multifamily houses:

- Heat meters SONOHEAT® 2WR4* and 2WR5
  MEGATRON®2 WFM / N / Q / R21…
  VOLUTRON®2 WFH / C21…
  SONOGYR® energy WSF / WSG / WSJ…*
  SONOGYR® WSD…*
- Consumption meters via pulse adapter AEW21.2, Relay PadpulsM1
- Electronic heat cost allocators MEMOTRON®2 WHE21*
- Meters of other manufacture on request

* Product no longer available, but still supported

3.2.3 Functions

Detailed information about the functions of the individual meters is given in the relevant pieces of documentation.
For more information, refer to the following sections:
8.6 "Data of M-bus devices available on ACS7… "
8.5.5 "Data of M-bus devices stored in the billing file"
8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

3.2.4 Equipment combinations

Within an M-bus system, the meters can be arbitrarily interconnected or connected to other M-bus compatible devices.

3.3 M-bus modules

Connection of I/O modules: On request.

3.4 Siemeca™ AMR devices

3.4.1 Introduction

The OZW10 (V4.0 or higher) also enables consumption meters of the Siemeca™ AMR system to be integrated via WTX16 or WTT16 radio nodes.
For detailed information about the system and the individual devices, refer to the relevant pieces of documentation:

Type Reference	*Family of products*	*Data Sheet*	*Planning Manual*
System	Siemeca™ AMR	N2870	J2870
WTT16	Siemeca™ AMR	N2874	
WTX16	Siemeca™ AMR	N2874	
WFM26…	MEGATRON®2	N5333	
WFQ26…	MEGATRON®2	N5333	
WMM26…	MEGATRON®2	N5335	
WFN26…	MEGATRON®2	N5338	
WFR26…	MEGATRON®2	N5338	
WMN26…	MEGATRON®2	N5339	
WFH26…	VOLUTRON®2	N5341	
WFC26…	VOLUTRON®2	N5341	
WMH26…	VOLUTRON®2	N5343	
WMC26…	VOLUTRON®2	N5343	
WHE26	MEGATRON®2	N2872	
AEW36.2	Siemeca™ AMR	N2873	

3.4.2 Use

- The Siemeca™ AMR system is used for consumption cost billing in multifamily houses. The following types of wireless consumption meters can be read out:
- Heat meters MEGATRON®2
- Water meters VOLUTRON®2
- Heat cost allocators MEMOTRON® WHE26
- Consumption meters via pulse adapter AEW36.2

3.4.3 Functions

For detailed information about the functions of the radio nodes and meters, refer to the System Description of Siemeca™ AMR and the related product documentation.

The meters send their data periodically to the WTX16 or WTT16 radio nodes. Up to 12 radio nodes are capable of forming a radio network comprising up to 500 meters. Radio nodes of the network can be connected to the OZW10 via M-bus. Every radio node stores all data of the meters and of the radio nodes of a network and delivers them for readout. The OZW10 cannot directly access the wireless meters.
For more information, refer to the following sections:
8.6 "Data of M-bus devices available on ACS7… "
8.5.5 "Data of M-bus devices stored in the billing file"
8.7 "Error messages from M-bus devices and alarm messages delivered by the OZW…".

3.4.4 Equipment combinations

Siemeca™ AMR can be combined with any other M-bus-compatible devices within an M-bus system.

The M-bus device handles every WTX16 or WTT16 radio node and every meter contained in the radio network as an autonomous M-bus device. An entire radio network produces 1 standard load on the M-bus. If several radio networks are interconnected within an M-bus system, different primary addresses (address of the radio network) must be assigned to the WTX16 or WTT16 radio nodes on the M-bus.

4 Interconnected systems with zone controllers

4.1 Introduction

The functionality of a standard controller is not sufficient to cover the requirements of complex plant. For this reason, several controllers can be interconnected.

For detailed information about interconnected systems, refer to the following pieces of documentation:

Title	*Type of document*	*Document*
LPB – Basic System Data	Data Sheet	N2030
LPB – Basic Engineering Data	Data Sheet	N2032
LPB – System Engineering	Basic Documentation	P2370

4.2 Use

Interconnected systems are used in terraced houses, multifamily houses with substations, or hotels with attached buildings, where the functionality of a standard controller is not sufficient to meet the requirements.
In that case, an RVD… primary controller is connected via LPB (Local Process Bus) to a maximum of 40 other controllers that control heat consumption. For remote operation and monitoring of these controllers via the M-bus system, the RVD2… can also be used.

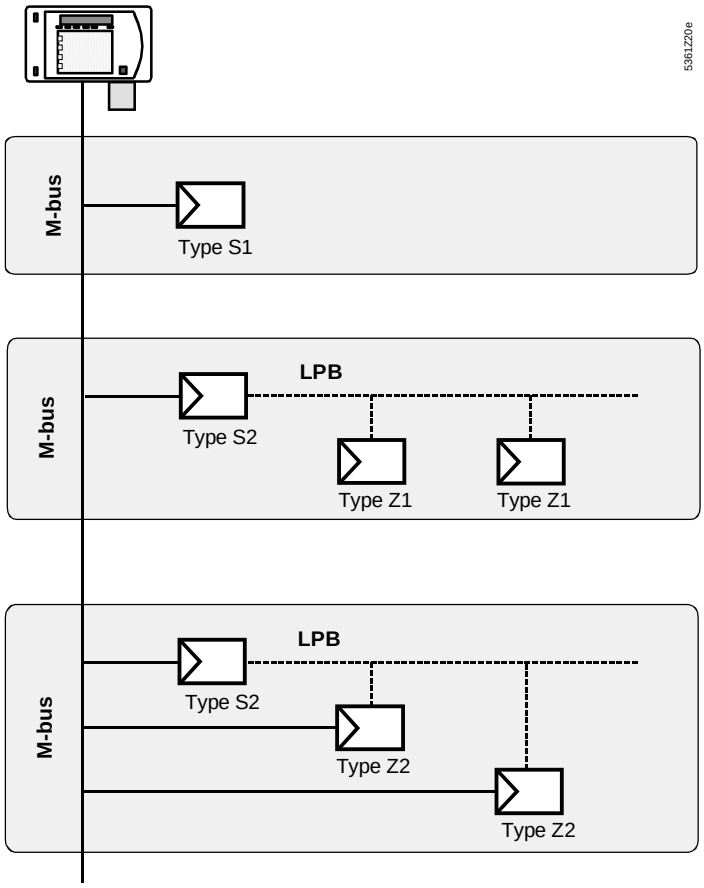
4.3 Functions

Data exchange between the various controllers takes place via LPB. The LPB is the basis for the following functions:

- Plant extensions with zone controllers
- Transmission of heat demand signals
- Common use of an outside sensor for several controllers
- Use of common sensor data (e.g. common flow temperature sensor)
- Transmission of forced and locking signals for DHW heating
- Influencing the output
- Transmission of fault messages received from the zone controllers

4.4 Equipment combinations

4.4.1 Makeup of an interconnected system



M-bus central unit

Situation A:
Individual controller connected directly to M-bus

Situation B:
Interconnected system of controllers where only the primary controller is integrated in the overriding management system

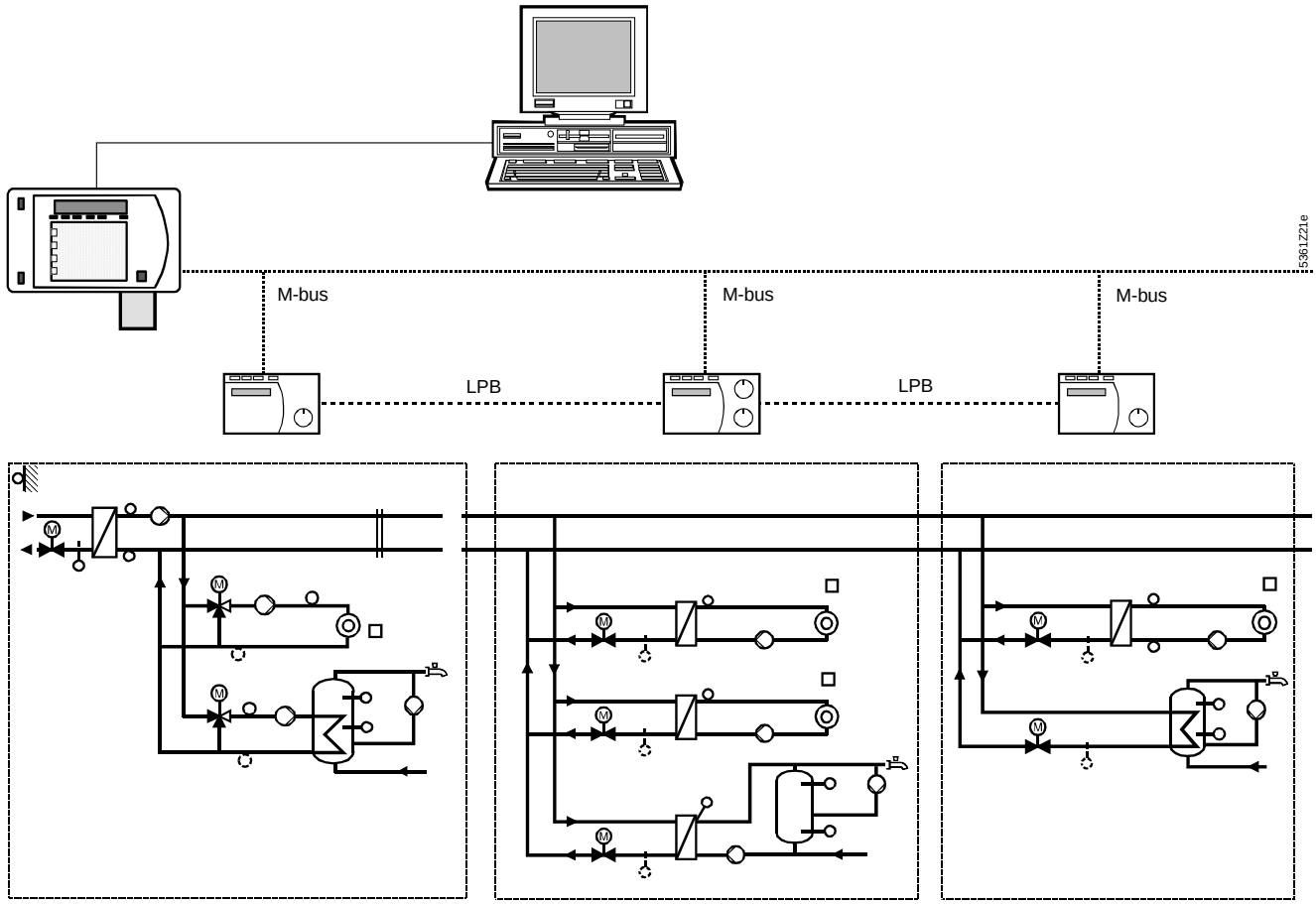
Situation C:
Interconnected system of controllers where both the primary controller and the zone controllers are integrated in the overriding management system

The following types of controllers are available:

Type	*Controller function*	*Examples*
S1	Individual district heating controller with M-bus	• RVD23… • RVD24… • RVP97 via OCI97
S2	Primary controller for interconnected systems (with own heating circuit and DHW heating)	• RVD23…
Z1	Zone controller in an interconnected system with controller type S2, **no** communication with the control center via M-bus	• RVL4… for mixing heating circuit, DHW heating or local boiler control • RVP3… for mixing heating circuit, DHW heating or local boiler control • RVD23… for one heating circuit and DHW heating • RVD24… for 2 heating circuits and DHW heating • RWI65… for ventilation circuit
Z2	Zone controller in an interconnected system with controller type S2, communication with the control center via M-bus	• RVD23… for 1 heating circuit and DHW heating • RVD24… for 2 heating circuits and DHW heating

4.4.2 Plant example

Example of an interconnected plant with 1 primary controller and 2 zone controllers:



Primary controller RVD230
Plant type 7–2

Zone controller RVD240
Plant type 1–8

Zone controller RVD230
Plant type 1–3

Both the primary controller RVD230 and the 2 zone controllers RVD240 and RVD230 are connected to the control center. The 2 zone controllers send their heat demand signals to the primary controller. They require no outside sensor.

4.4.3 Functions of the zone controllers

Functions of the zone controllers in an interconnected system	*RVD2…*	*RVL47…*	*RVP3…*	*RVA66…*	*RWI65*
Heat demand (zone controller is the source)	●	●	●	●	●
Locking signals (zone controller is the recipient)	●	●	●	●	●
Forced signals (zone controller is the recipient)	●	●	●	●	●
Output control					
• External locking of DHW heating	●*				
• External forcing of DHW heating	●*				
• External space heating control	●*				

* Prerequisite: At least one RVD2… in the interconnected system sends the load control signals

5 Engineering

5.1 Introduction

This chapter covers fundamentals of engineering.

Following is required for the M-bus system, depending on the application:

- PC (refer to subsection 2.1.9 "Equipment combinations")
- PC software (plant operating software ACS7…, recommended is ACS741 or ACS785, depending on the application, refer to subsection 2.2.2 "Use")
- 2 modems or standard null modem cable (refer to section 6.1 "Communication between ACS7… and OZW…")
- M-bus central units OZW… (refer to sections 2.2 "M-bus central unit OZW10" and 2.3 "M-bus central unit OZW111")
- M-bus repeater WZC-R250 (refer to section 2.6 "M-bus repeater WZC-R250")
- M-bus signal converter WZC-P… (refer to sections 2.4 "M-bus signal converter WZC-P250" and 2.5 "M-bus signal converter WZC-P60")
- Components for lightning protection (refer to section 8.2 "Protection against transients ")
- Cable (refer to sections 5.4 "M-bus" and 5.5 "RS-485 port")

5.2 PC software

The following general conditions apply to the ACS7… programs "ACS Operation", "ACS Alarm", "ACS Batchjob" and "ACS Service":

- In terms of programs, the number of plants is not limited. The number of supported communication centers is only limited by the size of the PC's hard disk
- With ACS7… V3.0 or higher, the maximum number of COM ports is unlimited. With the former versions, the maximum number of COM ports is 4
- For every direct connection to a communication center, a COM port and a standard null modem cable are required (refer to section 6.1 "Communication between ACS7… and OZW…")
- Several communication centers can be connected via COM port using a modem. For the COM port and each communication center, one modem is required
- 2 different programs can be connected simultaneously to 2 different plants via different COM ports. Within one and the same program, it is not possible to have a simultaneous connection to several plants
- ACS Operation and ACS Batchjob can be connected simultaneously to the same plant

5.3 Calculation of the required number of M-bus central units

5.3.1 M-bus central unit OZW10

General

Internally, the OZW10 stores all device data required for the local display and the memory card. Data storage is dynamic. This means that each M-bus device only uses the amount of storage space it needs. With certain types of M-bus devices (e.g. SONOGYR® energy, MEGATRON®2), the amount of data to be transmitted can be parameterized. With the Siemeca™ AMR devices, the amount of data is determined by the WTX16 or WTT16 radio node on the M-bus.
Using the ACS7…, the device data can be accessed via the internal storage of the OZW10 or directly via the devices on the M-bus. Direct access to the devices is ac-

complished through a transparent data channel. For this reason, the ACS7… can also access device data that are not filed in the central unit's storage. The transparent access to the Siemeca™ AMR devices is always made by accessing the image of the meter data in the WTX16 or WTT16 radio nodes on the M-bus. Direct access to the wireless meters is not possible.

Calculating the number of M-bus devices

For straightforward determination of the maximum number of M-bus devices per OZW10, the following table can be used. It is recommended to include a reserve of 10 % for plant or function extensions at a later stage.

Type of M-bus device	*Number (incl. 10 % reserve)*
Heat meters SONOHEAT® 2WR5 with	
• M-bus module up to V1.06	316
• M-bus module of V2.01 or higher	171
Heat meters MEGATRON®2 [1)]	396
Pulse adapter AEW21.2 (1 meter)	675
Pulse adapter AEW21.2 (2 meters)	337
Pulse adapter Relay PadpulsM1	675
District heating controller SIGMAGYR® RVD2…	675
Siemeca™ AMR devices [3)]	232

Combinations	*Number (incl. 10 % reserve)*
SONOHEAT® 2WR5 [2)] and RVD2…	142 each
SONOHEAT® 2WR5 [2)] and AEW21.2 (1 meter)	148 each
SONOHEAT® 2WR5 [2)] and AEW21.2 (2 meters)	130 each
SONOHEAT® 2WR5 [2)], RVD2… and AEW21.2 (2 meters)	112 each
MEGATRON®2 [1)] and RVD2…	269 each
MEGATRON®2 [1)] and AEW21.2 (1 meter)	291 each
MEGATRON®2 [1)] and AEW21.2 (2 meters)	231 each
MEGATRON®2 [1)], RVD2… and AEW21.2 (2 meters)	180 each

[1)] Device on M-bus with standard setting application selection = (1, 3, 6)
[2)] With M-bus module of V2.01 or higher
[3)] Total of all devices, valid for functions of V1.3 or higher and with standard setting application code = 3

For a more precise determination of the number of M-bus devices, the following rules must be observed:

- The maximum number of M-bus devices is limited to 750. It is recommended to include a reserve of 10 % should plant extensions become necessary at a later time
- For primary-addressed M-bus devices, the upper limit is 250 devices. This number can be increased by using secondary-addressed M-bus devices

For checking the storage space, a credit system is used. For that purpose, the OZW10 has a basic credit. Each M-bus device charges that basic credit with a certain value. Certain reserves should be included to allow for plant extensions at a later time.
The amount of data of the M-bus devices marked with * can be parameterized. If a setting other than the standard setting is used, the loading must be determined according to section "7.5 Storage space requirements of M-bus devices".

The following table provides information about the basic credit of the OZW10 and the loading of the individual M-bus devices. For each connected M-bus device, the respective loading will be subtracted from the basic credit. The balance of basic credit and all loadings must always be positive.

Type of M-bus device	*Version*	*Remarks*	*Number*	*Credit*	*Total*
OZW10	3.0	Basic credit	1	47547	47547
SONOHEAT® 2WR4, 2WR5	1.x, 2.x	M-bus module up to V1.06 M-bus module of V2.01 or higher		–135 –250	
SONOGYR® WSD…	3, 28, 29, 30	WZD-MB V1		–105	
		WZD-MB V2, 3		–113	
SONOGYR® energy [1]	2, 3, 4	Standard setting "Application selection" = (1, 3, 4, 6)		–130	
MEGATRON®2 [1] M-bus	14, 15, 16	Standard setting "Application selection" = (1, 3, 6)		–108	
VOLUTRON®2 [1] M-bus	153	Standard setting "Application selection" = (1, 3, 6)		–96	
MEMOTRON® 2 WHE21	48, 52			–31	
AEW21.2	64, 65, 68	Per activated input		–39	
Relay PadPulsM1	5, 6, 8			–30	
RVD2…	from V2.1			–51	
SIGMAGYR® RVP97	2.x, 3.x, 4.x			–20	
Siemeca™ AMR WTX16, WTT16 [2]	1.3, 1.4	Radio nodes on M-bus		–60	
		Radio nodes in the radio network		–51	
Siemeca™ AMR MEGATRON®2 [2]	53, 55	Standard setting "Application code = 3"		–186	
Siemeca™ AMR VOLUTRON®2 [2]	201, 202	Standard setting "Application code = 3"		–186	
Siemeca™ AMR WHE26 [2]	35	Standard setting "Application code = 3"		–161	
Siemeca™ AMR AEW36.2 [2]	2	Standard setting "Application code = 3"		–186	
Reserve		10 % of basic credit	1	–4755	–4755
Total		**Value must be > 0**			**>0**

[1] The scope of data of these M-bus devices can be parameterized. If the application used is different from the standard application, the load must be determined according to section 7.5 "Storage space requirements of M-bus devices".

[2] The scope of data of the Siemeca™ AMR devices is determined by the WTX16 or WTT16 radio node on the M-bus, where it can be parameterized. If the application used is different from the standard application, the load must be determined according to section 7.6 “Amount of storage space required by Siemeca™ AMR devices”.

For meters of other manufacture, the amount of storage space required must be determined depending on the project. The storage space required depends on the type of device and its version. To calculate the amount of storage space, the M-bus telegram specification of the relevant device is required.

General rule: The amount of storage space required corresponds to the telegram length in bytes minus 4.

5.3.2 M-bus central unit OZW111

General

Internally, the OZW111 only stores the device list and the alarm data. The amount of storage space required is the same for all connected devices. The device data are accessed directly via the ACS7… . Direct access to the devices is made possible via a transparent data channel.

Calculating the number of M-bus devices

When using the OZW111, the maximum number of M-bus devices is limited to 5. Following must be noted however:

Note

The SONOHEAT® heat meters with an M-bus module up to V1.06 produce a bus load of 1.5. A SONOHEAT® heat meter with an M-bus module up to V1.06 corresponds to 1.5 devices: This means that a maximum of 5/1.5 = 3 SONOHEAT® heat meters with an M-bus module up to V1.06 can be connected to an OZW111.
All other devices **and** SONOHEAT® heat meters with an M-bus module of V2.01 or higher correspond to 1 bus load.
1 pulse adapter AEW21.2 with 2 active inputs represents 2 devices.
RVP97 district heating controllers and Siemeca™ AMR are not supported.

M-bus cable lengths

The OZW111 has the M-bus signal converter integrated. M-bus signal converters WZC-P250 or WZC-P60 are not required. No M-bus repeater WZC-R250 may be connected.
For cables with a cross-sectional area of 0.8 mm^2, following applies:

- The maximum permissible cable length between the 2 devices with the greatest distance is 100 m
- The total cable length is limited to 500 m

5.4 M-bus

5.4.1 General

The M-bus conforms to EN 1434-3. It is continually developed by the M-bus User Group and is now a widely used standard for data readout of heat meters, hot and cold water meters, heat cost allocators, etc.
Detailed information about the M-bus can be found on the Internet under www.m-bus.com/.

Features

Compared to readout with the help of pulses, the M-bus offers the following benefits:

- The data read out correspond to the display on the meter. Pulses will not be lost
- The pulse source (initial reading, pulse valency, etc.) need not be programmed
- More information is provided

Compared to other bus systems (LON, EIB, CAN, etc.), the M-bus offers the following benefits:

- Very reliable data transmission
- High immunity level
- Moderate connection costs
- Low cabling costs
- Long distances without requiring repeaters
- Large number of devices without requiring repeaters
- Any choice of topology
- Favorably-priced integration of battery-powered devices
- Adequate data transmission rate

Owing to the support of a large number of **standard data,** the M-bus central units can read the majority of M-bus devices with no need for making specific adjustments. However, with M-bus devices using supplier-specific data, or with devices demanding supplier-specific processes to read data, adjustments for the support may have to be made.

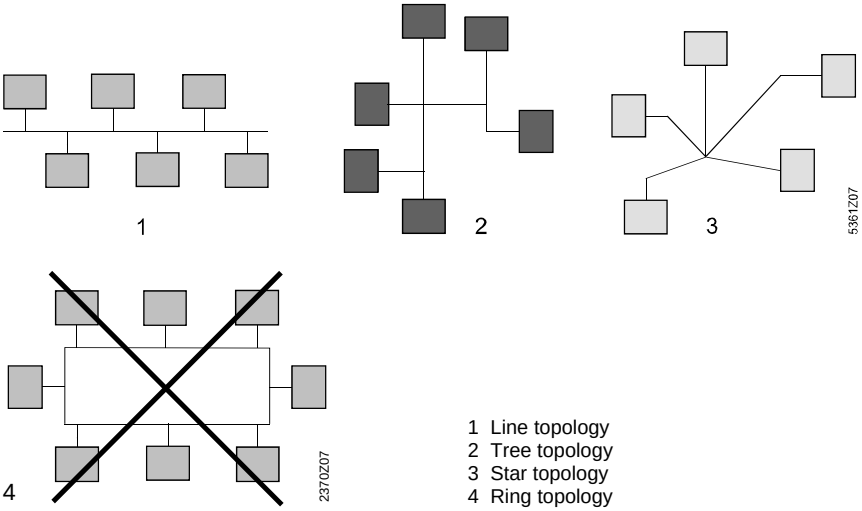
5.4.2 Fundamentals

Bus principle

- Single master-slave principle: Within an M-bus system, only 1 M-bus master is permitted (e.g. OZW10 with WZC-P250)
- Data transmission is always triggered by the M-bus master. The connected M-bus devices (slaves) cannot answer on their own
- Transmission mode is asynchronous, half-duplex

Bus topology

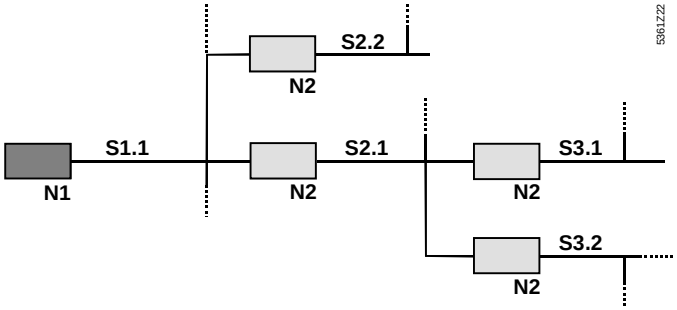
All bus topologies are permitted (with the exception of ring topology): Star, line, tree and any combinations of them.



1 Line topology
2 Tree topology
3 Star topology
4 Ring topology

Segments

Using repeaters, an M-bus system can be subdivided into any number of segments in order to increase the rate of transmission or to make system extensions.



N1 M-bus master
N2 M-bus repeater
Sx.y M-bus segment x.y

Cable

- The cable required is a twisted 2-core cable
- The bus connections of the M-bus devices (slaves) are interchangeable
- The M-bus requires no bus termination

Rate of transmission

- The M-bus permits communication at 300, 2,400, 9,600 or 38,400 Baud. Different Baud rates can be used on one and the same plant
- The OZW10 supports rates of maximum 9,600 Baud, the OZW111 2,400 Baud
- The maximum rate of transmission is dependent on the types of M-bus devices, the distances, the number of M-bus devices and the types of cable used by the M-bus system
- The rate of transmission can be increased through the use of repeaters
- For calculating the rate of transmission, refer to section 5.4.5 "Sizing"

Distances

- The M-bus permits cable lengths of more than 10 km (one M-bus device, 1.5 mm^2 cable). Recommended are cable lengths of no more than 4 km
- The maximum distance is limited by the number of M-bus devices, the rate of transmission, cable routing and the types of cable used
- The M-bus network can be extended to almost any length through the use of repeaters
- For calculating the cable lengths, refer to section 5.4.5 "Sizing"

Addressing

The M-bus uses 2 kinds of addressing: Primary addressing and secondary addressing. They can be combined within a system.

Primary addressing

Within a system, a maximum of 250 primary addresses can be assigned. Normally, the primary addresses are assigned when setting up the M-bus devices. If there are more than 250 devices in a system, secondary addressing must be used. Even the use of repeaters cannot extend the space for primary addressing.

Secondary addressing

Secondary addressing is an address space extension of primary addressing. The secondary address comprises a total of 8 bytes. This offers an almost unlimited address space. The assignment of manufacturers' codes eliminates address conflicts between products of different manufacture. Using unambiguous address assignment ex factory and a special procedure, the devices can be identified without giving the M-bus devices special addresses when setting up the system.

OZW10 and OZW111 can communicate with both primary-addressed and secondary-addressed devices. The types of addressing can also be mixed. For more information, refer to section 8.3 "Search run of central units OZW10 and OZW111".

5.4.3 Protection against transients

Introduction

Especially in community and district heating systems, bus cables are also laid outside the buildings. Hence, the devices are exposed to transients caused by lightning and must therefore be protected.

Regulations

- In general, protection against transients is required **whenever the bus cables leave the building**
- Protective measures by Siemens are not required in the following situations:
  The customer agrees that Siemens Building Technologies will have to assume no responsibility should damage due to lightning occur
- All bus cables are laid inside the buildings

Restrictions

The proposed protection against transients does not offer protection against

- permanent overvoltages (mains voltage)
- transients that reach the M-bus devices via the house installation (water pipes, mains connection)

Components, mounting, installation

Each bus cable and the devices that need to be protected call for specific protective equipment. For this reason, only the tested components mentioned in section "8.2 Protection against transients " may be used.

Electrical installation

When laying the M-bus cable, the local regulations for electrical installations must be complied with.
For detailed information about compliance with EMC directives, refer to Data Sheet N2034.

5.4.4 Planning process

A number of factors have a considerable impact on planning M-bus plant:

- The number and types of M-bus devices used on the plant
- The distribution of the M-bus devices in the plant
- Mounting locations for the central unit, signal converters and repeaters
- The distances between the various M-bus devices
- The cable (type of cable, length and cross-sectional area)
- The data transmission rates
- The proposed planning stages of the M-bus plant

The major task of the planning process is to collect all information that is required and to determine the number of locations for the central unit(s), signal converters and re-

peaters, cable routing and the type of cable. Normally, this is an iterative process where a first approach is made followed by checking. Then, if required, adjustments are made.

Procedure

1. Prepare a plant diagram:
   First, enter all M-bus devices and all distances in the diagram.
2. Select the cable routing:
   If cable routing is not specified, it should be chosen such that distances will be as short as possible. It should be taken into consideration that star-like cable routing offers advantages when making fault analyses and uses shorter distances between signal converters or repeaters and M-bus devices. Line topology, by contrast, requires less cable. Normally, optimal cable routing is a mixture of star and line topologies (tree topology).
3. Determine the number of central units, signal converters and repeaters and select their locations:
   Based on the number of M-bus devices used, the minimum number of M-bus central units required (refer to section 5.3 "Calculation of the required number of M-bus central units"), signal converters and repeaters are determined. The central units, signal converters and repeaters are entered in the plant diagram, choosing possible locations.
4. Check the approach:
   The approach must be checked for each M-bus segment. Two criteria must be observed (refer to subsection 5.4.5 “Planning process”):
   - Minimum bus voltage at the M-bus devices (slaves)
   - Maximum rate of transmission
5. Adjust the approach:
   If checking the approach reveals that the permissible limits per M-bus segment are not observed, the M-bus segment must be newly sized. The following readjustments are possible:
   - Subdivision of individual M-bus segments by means of repeaters
   - Relocation of signal converters or repeaters
   - Increase of the cross-sectional area of the bus cable
   - Change of system topology (e.g. star topology in place of line topology, or vice versa)
   - Combination of several pairs of lines
   - Then, the approach must be checked again (back to point 4.).

5.4.5 Sizing

In each M-bus segment, it must be ensured that the required minimum bus voltage is available for all M-bus devices (slaves) and that the required rate of data transmission is observed.

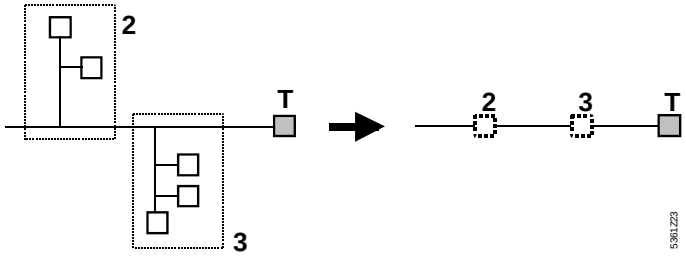
Quick reference

The table below contains a number of basic application examples for which a detailed analysis of the bus voltage and of the rate of data transmission is not required.

Type of plant	*Maximum distance*	*Total cable length*	*Dia. / cross-sectional area*	*Number of M-bus devices (slaves)*	*Maximum rate of transmission*
Smaller residential buildings	350 m	1000 m	0.8 mm	250	9,600 Baud
Larger residential buildings	350 m	4000 m	0.8 mm	250	2,400 Baud
				64	9,600 Baud
Smaller town sections	1000 m	4000 m	0.8 mm	64	2,400 Baud
Larger town sections	3000 m	5000 m	1.5 mm^2	64	2,400 Baud
Village, town section	5000 m	7000 m	1.5 mm^2	16	300 Baud
Point-to-point connection	10,000 m	10,000 m	1.5 mm^2	1	300 Baud

Minimum bus voltage

- Each M-bus device (slave) is powered via M-bus and, therefore, produces a voltage drop on the bus cables
- For all M-bus devices (slaves) at the final points of an M-bus segment, the minimum bus voltage must be checked
- The voltage drop down to the final points is determined by the type of cable and the number, distance and arrangement of the connected M-bus devices (slaves)
- For calculating the voltage drop down to the final points (T), the M-bus devices (slaves) on the side branches are mapped on the branch to be calculated. The voltage drop on the side branches is of no importance to the branch to be calculated



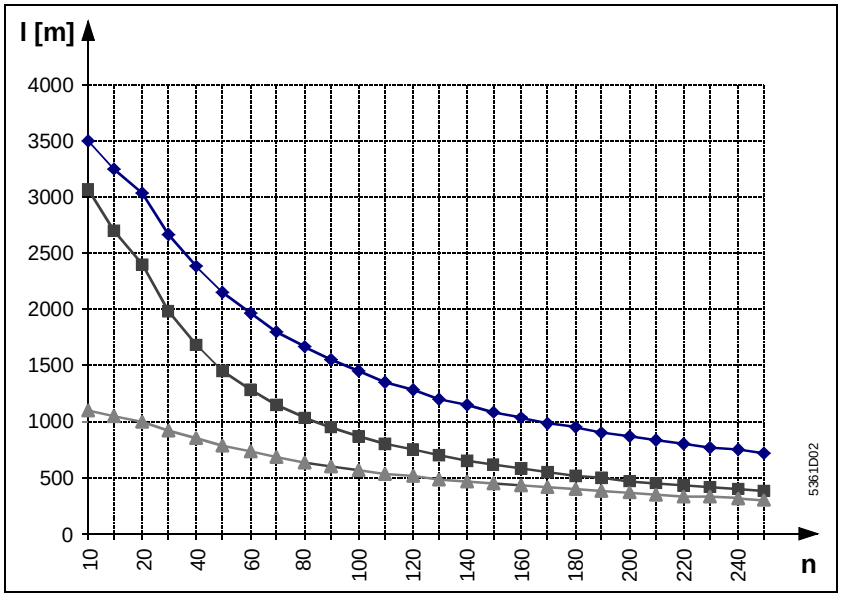
M--bus devices (slaves) on the branch to be calculated

Cable length charts

When using cable length charts, it is not necessary to calculate the voltage drop. The charts show

- the maximum cable length to the final point depending on the cross-sectional area
- the number of connected M-bus devices (slaves)
  Note: The SONOHEAT® heat meters with an M-bus module up to V1.06 produce a bus load of 1.5. A SONOHEAT® heat meter with an M-bus module up to V1.06 corresponds to 1.5 devices. All other devices and SONOHEAT® heat meters with an M-bus module of V2.01 or higher correspond to 1 bus load.

For additional charts, refer to section 7.4 "Cable length charts".



Cable lengths based on a cable diameter of 0.8 mm

l Cable length [m]
n Number of M-bus devices
Maximum cable length with equidistant distribution of the M-bus devices (slaves)
Maximum cable length if all M-bus devices (slaves) are connected to the end of the cable
Same as ; communication works in spite of a short-circuit on one of the M-bus devices (slave) (M-bus component TSS721)

For calculation formulas for the voltage drop, refer to EN 1434-3.

Maximum rate of data transmission

- The total of all cable lengths, the connected M-bus devices and protection devices produce capacitance in the M-bus segment. This capacitance restricts the rate of data transmission.

$$C_{Segment} = C_{Master} + C_{Cable} + n \times C_{Slave} + k \times C_{Protection}$$

$C_{Segment}$ Total capacitance in the M-bus segment
C_{Master} Initial capacitance of M-bus master = 200 nF
C_{Cable} Cable capacitance = total cable length l × capacitance per unit length (typically, e.g. cable J-Y(St)Y 2 × 2 × 0.8: C_{Cable} = l × 120 nF/km)
C_{Slave} Input capacitance of M-bus devices (slaves) = 0.5 nF
n Number of M-bus devices (slaves)
Note: The SONOHEAT® heat meters with an M-bus module up to V1.06 correspond to a bus load of 1.5. A SONOHEAT® heat meter with an M-bus module up to V1.06 corresponds to1.5 devices. All other devices and SONOHEAT® heat meters with an M-bus module of V2.01 or higher correspond to 1 bus load
$C_{Protection}$ Input capacitance of protection devices (type 1: 2.3 nF; type 2: negligible)
k Number of external protection devices

- The maximum rate of data transmission per M-bus segment can be determined with the help of the following table

Total capacitance of M-bus segment	*Maximum rate of data transmission*
Up to 382 nF	9,600 Baud
Up to 1528 nF	2,400 Baud
Up to 12222 nF	300 Baud

- The lowest of all maximum rates of data transmission of the M-bus segments determines the maximum rate of data transmission in the entire M-bus system

5.5 RS-485 port

5.5.1 General

- The signal converter is connected to the OZW10 via the RS-485 port
- The M-bus protocol serves as the transmission protocol at the RS-485 port
- The only bus topology permitted is line topology
- The cable used is a twisted 2-core cable

5.5.2 Planning

- A maximum of 1 signal converter WZC-P250 or 1 signal converter WZC-P60 can be connected to the OZW10. It is not recommended to connect WZC-P250 signal converters in parallel as these produce an additional load on the M-bus
- The maximum cable length for all permitted rates of data transmission (300…9,600 Baud) is 1000 m, based on a cable diameter of 0.8 mm. The maximum cable length is not restricted by the proposed protection circuit

5.5.3 Protection against transients

In principle, the regulations are the same as those for the M-bus. For details, refer to section 5.4.3 “Protection against transients“.

5.5.4 Electrical installation

- When laying the RS-485 cable, the local regulations for electrical installations must be complied with
- For important information about compliance with EMC directives, refer to Data Sheet N2034

6 Communication

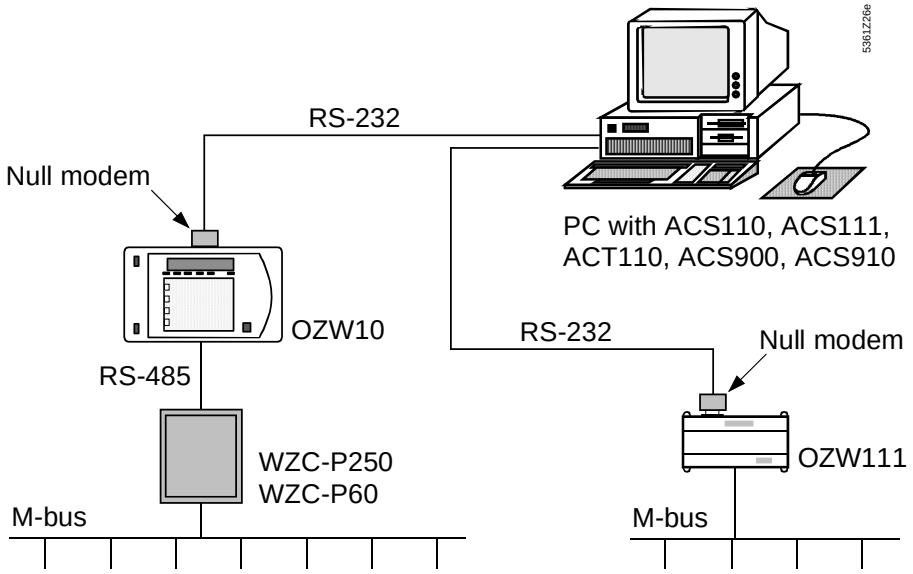
6.1 Communication between ACS7… and OZW…

The connection between ACS… and OZW… can be established either directly or via modem. Both the ACS… and the OZW… must be appropriately parameterized.

6.1.1 Direct connection

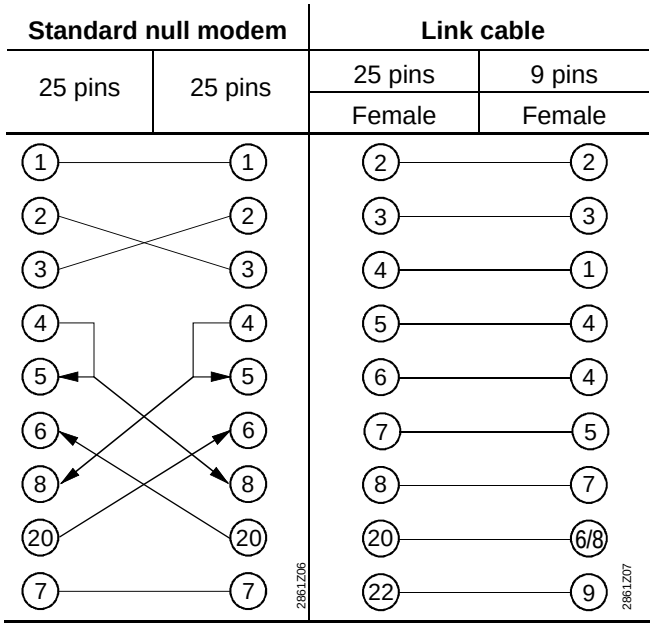
In the case of the direct connection, a null modem is required between M-bus central unit and PC.

Makeup



Null modem, link cable

For the direct connection, a commercially available standard null modem (OZW10) or link cable (OZW111) is required. The connections must be as follows:



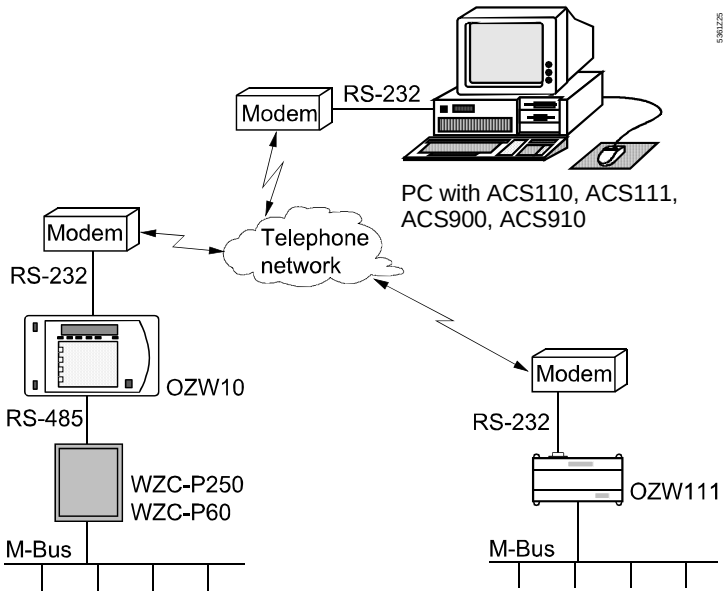
Data transmission

Rate of data transmission:	9,600 Baud
Parity, data bits, stop bits:	None, 8, 1

6.1.2 Telephone connection

When using the connection via the telephone network, a Hayes-compatible modem is required on both sides.

Makeup



Modem settings ACS

On the PC side, all drivers of the modems installed under Windows can be used with ACS7… V3.0 or higher.

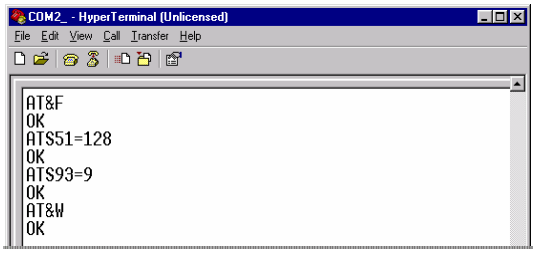
Modem settings OZW10

Before connecting a modem to the OZW10, the settings for the relevant modem must be made. These settings are made with an ACS connected directly to the OZW10. The settings can be made with the "Popcard" application on page "Configuration PC / Modem":

	Modem Baud rate	Modem string for modem initialization	Modem string for modem reset	Modem string for dialing	Modem string for hang up	Modem string for modem suffix	Modem speed adjust
Analog modem:							
Default setting	2,400	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH^M	^M	On
ELSA 56k / 56k fun	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH^M	^M	On
U.S.Robotics 56k	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH^M	^M	On
Zyxel Omni 56k	9,600	ATE0V0&C1&D2&S0=2^M	ATZD^M	ATDP	~~~+++~~~ATH^M	^M	On
ISDN							
ELSA ISDN*	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATD	~~~+++~~~ATH^M	^M	Off
GSM							
Siemens TC35	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH^M	^M	Off
Siemens Natel S35i	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH^M	^M	Off

= setting not identical with the default setting of OZW10

* The ISDN adapter requires the following presettings, which must be made with a terminal program (e.g. Windows Hyperterminal) before connecting the modem to the central unit:



For new types of modems, the OZW10 standard settings for modem communication can mostly be used. If it does not work with the standard settings, the settings must be changed on site based on the specification given in the modem's User Manual.

Modem settings OZW111

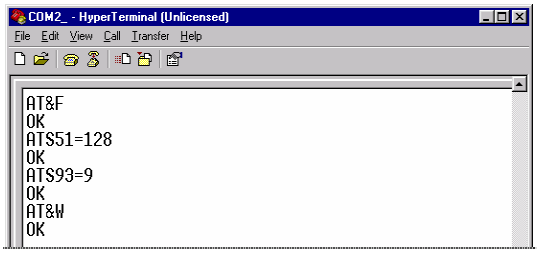
Before connecting a modem to the OZW111, the settings for the relevant modem must be made. These settings are made with an ACS connected directly to the OZW111.

The settings can be made with the "Popcard" application on page "Configuration PC / Modem":

	Modem Baud rate	Modem string for modem initialization	Mode string for modem reset	Modem string for dialing	Modem string for hang up	Modem string for modem suffix
Analog modem:						
Default setting	2,400	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH0^M	^M
ELSA 56k / 56k fun	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH0^M	^M
U.S.Robotics 56k	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH0^M	^M
Zyxel Omni 56k	9,600	ATE0V0&C1&D2&S0=2^M	ATZD^M	ATDP	~~~+++~~~ATH0^M	^M
ISDN						
ELSA ISDN*	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATD	~~~+++~~~ATH^M	^M
GSM						
Siemens TC35	9,600	ATE0V0&C1&D2&S0=2^M	ATZ^M	ATDP	~~~+++~~~ATH0^M	^M

= setting not identical with the default setting of OZW111

* The ISDN adapter requires the following presettings, which must be made with a terminal program (e.g. Windows Hyperterminal) before connecting the modem to the central unit:



For new types of modems, the OZW111 standard settings for modem communication can mostly be used. If it does not work with the standard settings, the settings must be changed on site based on the specification given in the modem's User Manual.

6.2 Communication with third-party systems

6.2.1 M-bus central units OZW10 and OZW111

Disclosure of RS-232 port

The RS-232 port uses the proprietary ADDP protocol. The port can be disclosed on request.

Printer

The M-bus central units do not support printer control via RS-232 port.

Fax

The M-bus central units do not support printer control via RS-232 port.

Pager

The M-bus central units do not support messages to a pager via RS-232 port.

SMS

The M-bus central units do not support SMS messages (mobile, e-mail, etc.).

6.2.2 PC software

All files can be exported or stored in ASCII hex format. The files can be handled with any text editor or spreadsheet program (such as Microsoft® Excel).

ACS Alarm

For further handling by other programs, the alarms receives are automatically exported to an ASCII file.

ACS Batchjob

Automatic export of data and files in ASCII hex format is accomplished with the help of the Batchjob software.

ACS OPC Server

An ACS… with OPC interface (OPC server, OPC = OLE for process control) is in preparation. Using the OPC interface, Windows-based third-party systems can access the M-bus system with the help of an OPC client.

7 Technical data

7.1 M-bus

7.1.1 Specification

M- bus system	*Designation*	*Condition*	*Minimum*	*Typically*	*Maximum*	*Unit*
Number of slaves per segment	n	WZC-P250 / -R250	0		250	
		WZC-P60	0		60	
Rate of data transmission	T	@ $C_{Segment} \leq 382$ nF	300	2,400	9,600	Baud
Bus voltage (system)	U	@ I_M = 0…400 mA	12		42	V
Bus voltage (master, idle condition '1')	$U_{M,R}$	@ I_M = 0…400 mA	24	40	42	V
Bus voltage (master, send '0')	$U_{M,S}$	@ I_M = 0…400 mA	U_{MR}–12		$U_{M,R}$–8.2	V
Bus voltage (slave idle condition '1')	$U_{S,R}$	@ $I_S \leq 1.5$ mA	± 21		± 42	V
Bus voltage (slave reception '0')	$U_{S,E}$	@ $I_S \leq 1.5$ mA	± 12			V
Bus idle current (master)	$I_{M,V}$	WZC-P250 / -R250	0		375	mA
		WZC-P60	0		90	mA
Bus short-circuit current (master)	$I_{M,K}$	WZC-P250 / -R250	470	500	530	mA
		WZC-P60	130	155	160	mA
Idle current (slave)	$I_{S,R}$	@ U_S = 21…42 V	0.75	1.2	1.5	mA
Transmit current (slave)	$I_{S,S}$	@ U_S = 12…42 V	11		20	mA

7.2 RS-485 specification

Specification	*Designation*	*Condition*	*Minimum*	*Typically*	*Maximum*	*Unit*
Number of RS-485 users (including the central unit)	m	With WZC-P250	2	2	2	
		With WZC-P60	2	2	2	
Rate of data transmission	T		300	2,400	9,600	Baud
Cable length	l				1,200	m
Bus voltage (Transmit)	U_T		± 1.5	± 2.5	± 5	V
Bus voltage (Receive)	U_R		± 0.2			V

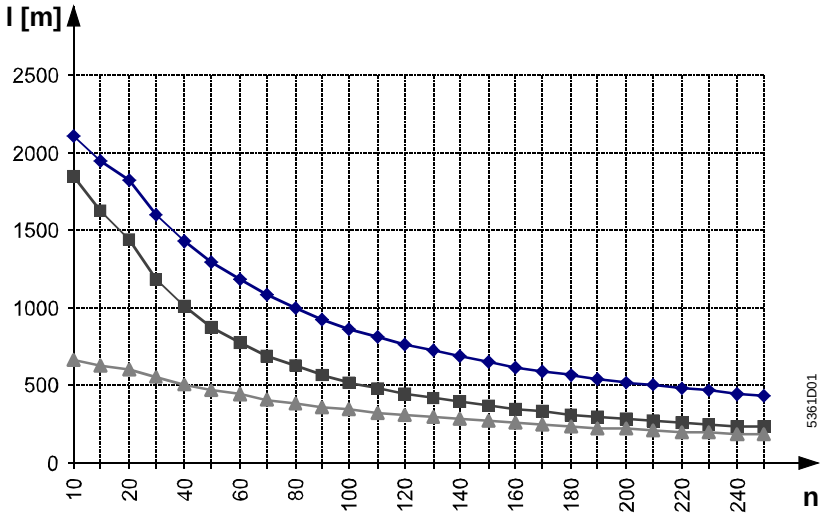
7.3 Copper cable, loop resistance

Diameter [mm]	*Cross-sectional area [mm²]*	*Loop resistance [Ω/km]*
0.4	0.13	283
0.6	0.28	126
0.8	0.50	71
1.13	1.0	36
1.38	1.5	24
1.60	2.0	18
1.78	2.5	14

7.4 Cable length charts

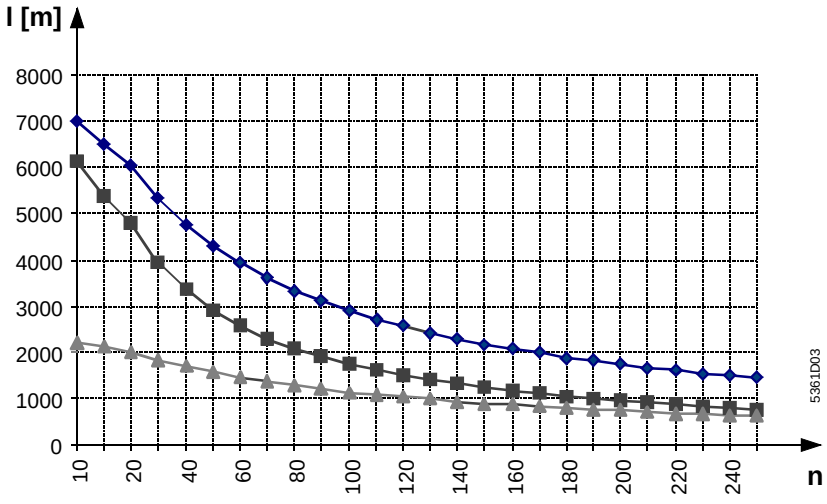
Note

In the following charts, "n" denotes the number of M-bus devices connected to the M-bus segment. The SONOHEAT® heat meters with an M-bus module up to V1.06 produce a bus load of 1.5. This means that a SONOHEAT® heat meter with an M-bus module up to V1.06 corresponds to 1.5 devices. All other devices and SONOHEAT® with an M-bus module of V2.01 or higher correspond to 1 bus load.



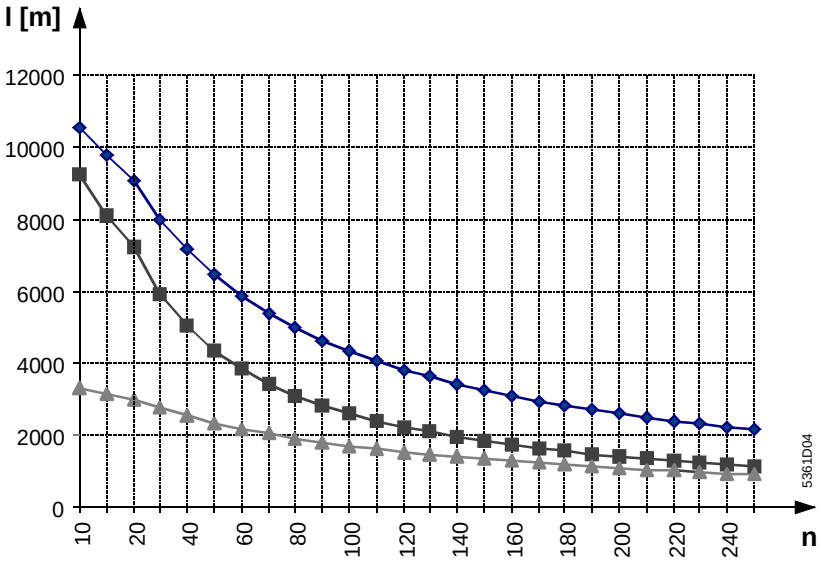
Cable lengths based on a cable diameter of 0.6 mm

l Cable length [m]
n Number of M-bus devices
Maximum cable length with equidistant distribution of the M-bus devices (slaves)
Maximum cable length if all M-bus devices (slaves) are connected to the end of the cable
Same as ; communication works in spite of a short-circuit on one of the M-bus devices (slave) (M-bus component TSS721)



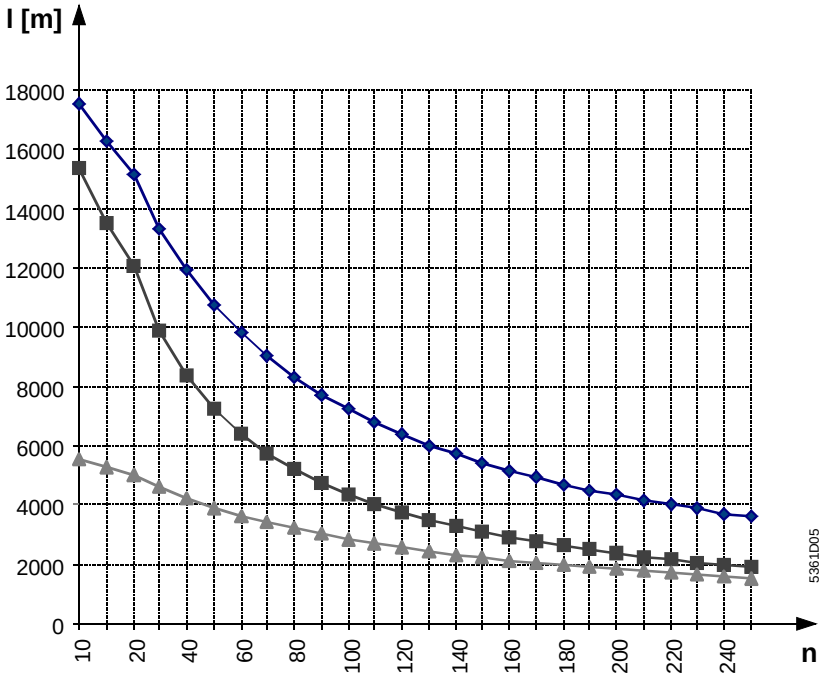
Cable lengths based on a cross-sectional area of 1.0 mm^2

l Cable length [m]
n Number of M-bus devices
Maximum cable length with equidistant distribution of the M-bus devices (slaves)
Maximum cable length if all M-bus devices (slaves) are connected to the end of the cable
Same as ; communication works in spite of a short-circuit on one of the M-bus devices (slave) (M-bus component TSS721)



Cable lengths based on a cross-sectional area of 1.5 mm^2

l Cable length [m]
n Number of M-bus devices
Maximum cable length with equidistant distribution of the M-bus devices (slaves)
Maximum cable length if all M-bus devices (slaves) are connected to the end of the cable
Same as ; communication works in spite of a short-circuit on one of the M-bus devices (slave) (M-bus component TSS721)



Cable lengths based on a cross sectional area of 2.5 mm^2

l Cable length [m]
n Number of M-bus devices
Maximum cable length with equidistant distribution of the M-bus devices (slaves)
Maximum cable length if all M-bus devices (slaves) are connected to the end of the cable
Same as ; communication works in spite of a short-circuit on one of the M-bus devices (slave) (M-bus component TSS721)

7.5 Storage space requirements of M-bus devices

7.5.1 General

Internally, the OZW10 stores all device data required for the local display and the memory card. Data storage is dynamic. This means that each M-bus device only uses the amount of storage space it needs. Calculation of the maximum number of possible M-bus devices per OZW10 based on the storage space requirement of the connected devices is described in subsection 5.3.1 "M-bus central unit OZW10".

With certain types of M-bus devices (e.g. SONOGYR® energy, MEGATRON®2), the amount of data to be transmitted can be parameterized. With these types of devices, the amount of storage space required is dependent on the type of device and the device version on the one hand, and, on the other, on the device-specific settings (e.g. application selection M-bus). For calculating the storage space requirements of these devices, the credits of all selected applications are added up.
The following subsections describe the credit requirements of the individual applications.

7.5.2 SONOGYR® energy WSF, WSG, WSJ

The information given applies to V2, V3 and V4

Application	*Block*	*Remark, note*	*Credit*	*Default*	*User-defined*
Basic requirement	–	Readout time, fault status	17	17	17
Cumulated values	1	Energy and volume	12	12	
Mean values	2	Power and flow rate	10		
Device info	3	Device description, serial number, hours run	43	43	
Measured values	4	Temperatures, power, flow rate	23	23	
Service info	5	Setpoints	11		
Set day values	6	Energy and volume	35	35	
Maximum values	7	Power or flow rate	10		
Monthly values	8	Energy or volume	106		
Monthly values tariff	9	Energy or volume	0		
Tariff values	10	Energy or volume	62		
Total				130	

7.5.3 MEGATRON®2

The information given applies to V14, V15 and V16.

Application	*Block*	*Remark, note*	*Credit*	*Default*	*User-defined*
Basic requirement	–	Readout time, fault status	17	17	17
Cumulated values	1	Energy and volume	12	12	
Mean values	2	Not available	0		
Device info	3	Device description, serial number, hours run	63	63	
Measured values	4	Temperatures, power, flow rate	23		
Service info	5	Setpoints	28		
Set day values	6	Energy and volume	16	16	
Maximum values	7	Not available	0		
Monthly values	8	Energy and volume	225		
Monthly values tariff	9	Not available	0		
Tariff values	10	Not available	0		
Total				108	

7.5.4 VOLUTRON®2

The information given applies to V153.

Application	*Block*	*Remark, note*	*Credit*	*Default*	*User-defined*
Basic requirement	–	Readout time, fault status	17	17	17
Cumulated values	1	Volume	6	6	
Mean values	2	Not available	0		
Device info	3	Device description, serial number, hours run	63	63	
Measured values	4	Flow rate	5		
Service info	5	Setpoints	18		
Set day values	6	Energy and volume	10	10	
Maximum values	7	Not available	0		
Monthly values	8	Energy and volume	120		
Monthly values tariff	9	Not available	0		
Tariff values	10	Not available	0		
Total				96	

7.6 Amount of storage space required by Siemeca™ AMR devices

7.6.1 General

The data of the Siemeca™ AMR devices are read out via the M-bus interface of the WTX16 or WTT16 radio node. The radio node on the M-bus has a data image of all radio nodes and meters used in the radio network. The data volumes of the meters transmitted via the M-bus are determined by the application code setting at the radio node on the M-bus. In contrast to the application selection, the application code does not allow for combinations to be made, but is ready predefined.

Application code	*Meaning*	*Standard setting for WTX16 and WTT16; version …*
1, 2	Cumulated values, set day values	… up to V1.1
3	Cumulated values, set day values, 1st monthly values	… up to V1.3
4	Cumulated values, set day values, 2nd monthly values	
Other	No change	

7.6.2 MEGATRON®2 cooling energy / heat meters, VOLUTRON®2 water meters

Only one user-defined application code is possible. Combinations are not permitted.

Application	*Application code*	*Remarks, notes*	*Credit*	*Standard setting up to V1.1*	*Standard setting V1.3 or higher*	*User-defined*
Basic requirement	–	Readout time, error status	17	17	17	17
Cum. values, set day values	1, 2	Cum. energy and cum. cooling energy, set day values	63	63	---	
Cum. values, set day values and 1st month values	3	Cum. energy and cum. cooling energy, set day values, monthly values energy	169	---	169	
Cum. values, set day values and 2nd month values	4	Cum. energy and cum. cooling energy, set day values, monthly values energy cooling	169	---	---	
Total				80	186	

7.6.3 Heat cost allocators MEMOTRON®2

Only one user-defined application code is possible. Combinations are not permitted.

Application	*Application code*	*Remarks, notes*	*Credit*	*Standard setting up to V1.1*	*Standard setting V1.3 or higher*	*User-defined*
Basic requirement	–	Readout time, error status	17	17	17	17
Cum. values, set day values	1, 2	Heat cost units, set day values	51	51	---	
Cum. values, set day values and 1st month values	3	Heat cost units, set day values, monthly values heat cost units	144	---	144	
Cum. values, set day values and 2nde month values	4	Heat cost units, set day values, monthly values heat cost units	144	---	---	
Total				68	161	

7.6.4 Pulse adapter AEW36.2

Only 1 user-defined application code is possible. Combinations are not permitted.

Application	*Application code*	*Remarks, notes*	*Credit*	*Standard setting up to V1.1*	*Standard setting V1.3 or higher*	*User-defined*
Basic requirement	–	Readout time, error status	17	17	17	17
Cum. values, set day values	1, 2	Meter reading, set day values	63	63	---	
Cum. values, set day values and 1st month values	3	Meter reading, set day values, monthly values meter reading	169	---	169	
Cum. values, set day values and 2nd month values	4	Meter reading, set day values, monthly values meter reading	169	---	---	
Total				80	186	

8 Addendum

8.1 Glossary

8.1.1 Type references

Type reference	*Description*
2WR4* / 2WR5	Ultrasonic heat meters SONOHEAT® (M-bus module)
ACS7…	Plant operating software ACS
ACS700, ACS712, ACS713, ACS715, ACS741, ACS785	Variants of ACS7…
AEW21.2	Pulse adapter (2 inputs) with M-bus
AEW36.2	Pulse adapter (2 inputs) for Siemeca™ AMR
OCI600	Central communication unit ALBATROS® (LPB)
OCI97*	M-bus interface for RVP97
OZW10	M-bus central unit
OZW111	M-bus central unit (mini telephone gateway)
PadPulsM1	Pulse adapter with M-bus from Relay GmbH (1 input)
RVD2…	District heating controllers SIGMAGYR® RVD23… and RVD24…
RVP97*	District heating controller SIGMAGYR®
WHE21*	Heat cost allocators with M-bus MEMOTRON®2
WHE26	Heat cost allocators MEMOTRON®2 for Siemeca™ AMR
WSD…*	Ultrasonic heat meters SONOGYR® (M-bus module)
WSF, WSG, WSJ…*	Electronic impeller type heat meters with M-bus SONOGYR®
WFM21…, WFQ21…,	Electronic impeller type heat meters with M-bus MEGATRON®2
WFN21…, WFR21…,	Electronic impeller type cooling energy / heat meters with M-bus MEGATRON®2
WFM26…, WFQ26…, WMM26…	Electronic impeller type heat meters MEGATRON®2 for Siemeca™ AMR
WFN26…, WFR26…, WMN16…	Electronic impeller type cooling energy / heat meters MEGATRON®2 for Siemeca™ AMR
WFH26…, WMH26…, WFC26…, WMC26…	Electronic impeller type water meters VOLUTRON®2 for Siemeca™ AMR
WTT16	Radio node (battery-powered) with M-bus for Siemeca™ AMR
WTX16	Radio node (mains-powered) with M-bus for Siemeca™ AMR
WZC-P250	M-bus / RS-485 signal converter for 250 M-bus devices
WZC-P60	M-bus / RS-485 signal converter for 60 M-bus devices
WZC-R250	M-bus repeater for 250 M-bus devices

* Product no longer available, but still supported

8.1.2 Abbreviations

Abbreviation	*Explanation*
ADDP	Asynchronous Data Duplex Protocol
GSM	Global System for Mobile Communications
ISDN	Integrated System Digital Network
M-bus	Meter bus conforming to EN 1434-3

Abbreviation	*Explanation*
M-bus slave	Meter, controller, I/O or repeater with M-bus slave interface
M-bus slave interface	Bus connection for an M-bus slave
M-bus master	M-bus central unit with M-bus master interface (e.g. OZW10 with WZC-P250 or OZW111)
M-bus master interface	Bus control and bus power supply for M-bus
M-bus signal converter	Signal converter with M-bus master interface (e.g. WZC-P250)
M-bus repeater	Signal amplifier with M-bus slave and M-bus master interface (e.g. WZC-P250); separates 2 M-bus segments
M-bus segment	Bus section; controlled and powered by the M-bus master interface
M-bus system	All devices and connections that, logically and physically, form an entity with the M-bus
M-bus central unit	Communication center for the M-bus system (e.g. OZW10 or OZW111)
OLE	Object Linking and Embedding
OPC	OLE for Process Control
SMS	Short Message System

8.1.3 References

[1] The M-bus, A Documentation, M-bus Usergroup (download from the Internet under www.m-bus.com/)

8.2 Protection against transients

8.2.1 Components

- Every bus cable and the devices to be protected demand protective elements matched to the relevant requirements. For this reason, only the tested components listed below may be used
- For the **protection of the M-bus devices,** there are 2 types of transient charge eliminators available:
  Type 1: Consisting of base and plug-in unit, for general use
  Type 2: Module, for exclusive use with M-bus devices that are already equipped with fine protection.

Type	*Component*	*Type (Phoenix)*	*Part no.*	*Use*
1	Basic unit Plug-in unit	**UFBK BE** **UFBK-M 2-PE 48AC-ST**	27 83 09 5 28 17 06 8	All M-bus devices
2	Module	**UBK 2-110**	27 97 97 1	M-bus devices with integrated fine protection [1)].

[1)] SONOGYR® energy, MEGATRON®2., RVD2…

For the **protection of the devices with RS-485** (OZW10 and signal converter):
Type 3: Consisting of basic unit and plug-in unit.

Type	*Component*	*Type (Phoenix)*	*Part no.*	*Use*
3	Basic unit Plug-in unit	**UFBK BE** **UFKB-M 2-PE 12DC-ST**	27 83 09 5 28 17 03 9	OZW10 and WZC-P… (only suited for 2-wire RS-485)

8.2.2 Sources

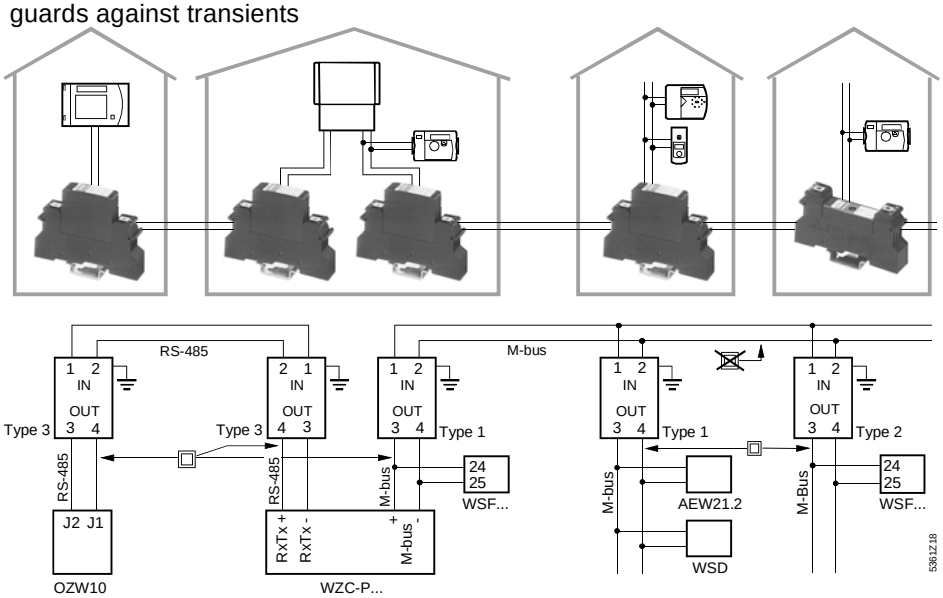
Phoenix Contact GmbH & Co. Flachsmarktstrasse 8-28 D-32825 Blomberg Tel. (052 35) 3-00 Fax (052 35) 3-4 12 00 E-Mail: info@phoenixcontact.com Internet: www.phoenixcontact.com	Phoenix Contact AG Ringstrasse 26 CH-8317 Tagelswangen Tel. (052) 354 55 55 Fax (052) 354 56 99 E-Mail: phoenixcontact@bluewin.ch
Phoenix Contact GmbH Favoritenstrasse 321 A-1108 Wien Tel. (01) 68076 Fax (01) 6887620 E-Mail: info@phoenixcontact.at Internet: www.phoenixcontact.at	

8.2.3 Mounting notes

Protection against transients is mounted on DIN rails.

8.2.4 Regulations for installation

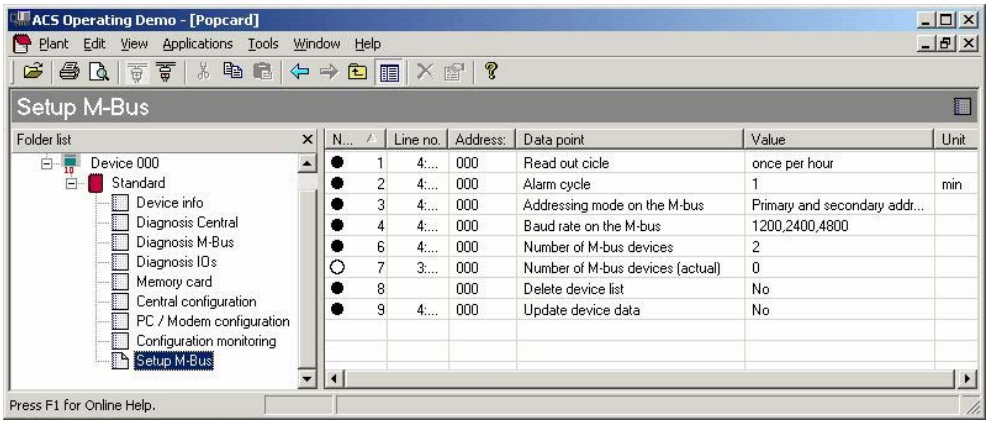
- Full scale protection against transients is based on a 3-stage protection concept: Gas-filled charge eliminator – ZNR – suppressor diode
- The protective function is ensured only when the installation is correctly made!
- In accordance with regulations, the DIN rail must be connected to the rail for potential equalization in the building
- For notes on installation of plant in compliance with EMC directives, refer to Data Sheet N2034
- The **polarity of the protective components must be observed**! The device to be protected must always be connected to output “OUT” of the protective device that guards against transients



8.3 Search run of central units OZW10 and OZW111

The OZW10 and OZW111 identify connected M-bus devices with the help of their automatic search run.

To match the search behavior of the central units to actual needs, they can be configured with the help of ACS Service or ACS Operation using the "Applications – Popcard" menu on page "Setup M-bus":


ACS Operating Demo - [Popcard]
Plant Edit View Applications Tools Window Help
Setup M-Bus
Folder list
Device 000
Standard
Device info
Diagnosis Central
Diagnosis M-Bus
Diagnosis IOs
Memory card
Central configuration
PC / Modem configuration
Configuration monitoring
Setup M-Bus
N... Line no. Address: Data point Value Unit
1 4:... 000 Read out cicle once per hour
2 4:... 000 Alarm cycle 1 min
3 4:... 000 Addressing mode on the M-bus Primary and secondary addr...
4 4:... 000 Baud rate on the M-bus 1200,2400,4800
6 4:... 000 Number of M-bus devices 2
7 3:... 000 Number of M-bus devices (actual) 0
8 000 Delete device list No
9 4:... 000 Update device data No
Press F1 for Online Help.

- **Type of addressing on the M-bus** (the types of addressing of the M-bus are described in subsection 5.4.2 "Fundamentals"):
  - Primary addressing: The search run only searches for primary-addressed devices. The primary addresses of the M-bus device are between 1 and 250. Each device must have a unique address. Not all devices have a primary address. Some devices only have a secondary address
  - Secondary addressing: The search run only searches for secondary-addressed devices. The secondary address space is nearly unlimited. When supplied, each secondary-addressable device already has a unique secondary address. Depending on the type of device, the secondary address can be changed by changing the customer number. Note: If a secondary-addressed device also has a primary address (>0), it will then only be addressed with its primary address
  - Primary and secondary addressing: The search run searches for primary- and secondary-addressed devices
- **Baud rates on the M-bus:** Here, it is possible to select the Baud rates at which the central unit searches for devices on the M-bus:
  - The OZW10 can search for devices at Baud rates of 300, 2,400 and 9,600. The default setting is 300 and 2,400 Baud
  - The OZW111 can search for devices at Baud rates of 300 and 2,400. The default setting is 300 and 2,400 Baud

  Number of M-bus devices: This setting is only available with the OZW10 and defines when the search run shall be aborted. The OZW10 starts the search run as soon as this setting is changed. It stops the search run as soon as the respective number of devices has been found. The number of M-bus devices also includes all devices of the Siemeca™ AMR system that are connected to the M-bus via the WTX16 or WTT16 radio nodes: Other radio nodes, MEGATRON®2, VOLUTRON®2, WHE26 or AEW36.2.
- **Device search run:** This setting is only available with the OZW111. This type of central unit starts the search run when setting it to "On". All entries relating to the devices previously found will be canceled. The search run is completed when the value changes back to "Off"
- **Number of M-bus devices (actual):** Here, the number of M-bus devices found is displayed. Each of the 2 activated inputs of the AEW… is regarded as 1 device.

The number of M-bus devices also includes all devices for the Siemeca™ AMR system that are connected to the M-bus via the WTX16 or WTT16 radio nodes: Other radio nodes, MEGATRON®2, VOLUTRON®2, WHE26 or AEW36.2

- **Cancel device list:** This setting is only available with the OZW10. All entries relating to the devices previously found will be canceled
- **Update device data:** The central unit reads out all data of the devices found

The search run made by the central units is as follows:

1. The search starts with the highest selected Baud rate and ends with the lowest. If a device responds to several Baud rates, the central unit will from now on use exclusively the highest Baud rate for addressing that device.
2. When searching for devices, secondary addressing is used first, then primary addressing. If a device with a primary address was already found with secondary addressing, the respective primary address will be omitted with the primary search run. From now on, the device will be addressed with the primary address.

Example

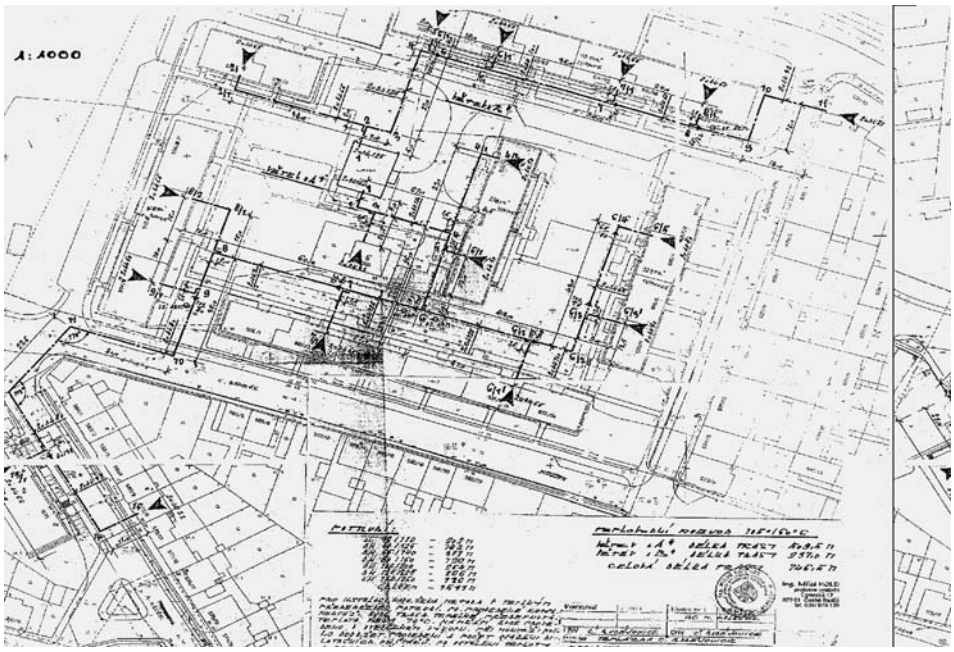
- The OZW10 is parameterized as follows:
  - Baud rates on the M-bus: 300 and 2,400
  - Type of addressing on the M-bus: Primary and secondary addressing

- The central unit makes the search run on the M-bus as follows:
  1.Search run at 2,400 Baud by means of secondary addressing
  2.Search run at 2,400 Baud by means of primary addressing
  3.Search run at 300 Baud by means of secondary addressing
  4.Search run at 300 Baud by means of primary addressing

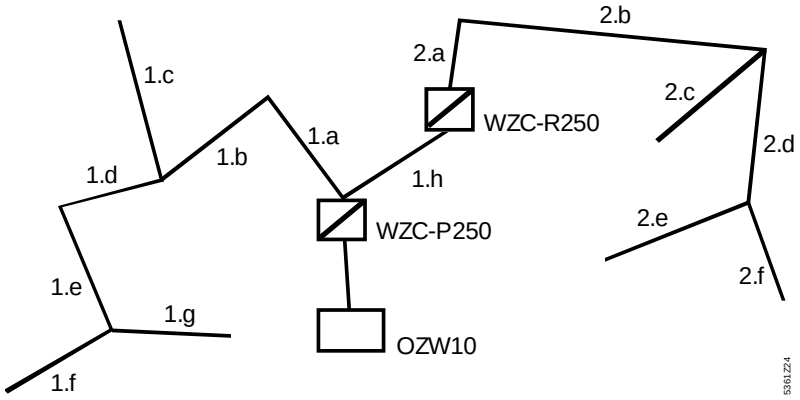
M-bus device settings				*OZW10 device list*	
No.	*Baud rate*	*M-bus address (primary address)*	*Customer number (part of secondary address)*	*Device number*	*Baud rate*
A	2,400	3	105	4	2,400
B	300	0	100	7	300
C	300	1	Device without secondary addressing	9	300
D	Auto 9,600 / 2,400 / 300	0	104	3	2,400
E	2,400	2	Device without secondary addressing	5	2,400
F	Auto 2,400 / 300	5	Device without secondary addressing	6	2,400
G	2,400	4	101	1	2,400
H	Auto 2,400 / 300	0	102	2	2,400
I	300	67	106	8	300
J	9,600	9	103	Not found	None

8.4 Plant documentation, planning the M-bus (examples)

Plant location



Bus topology and bus sections



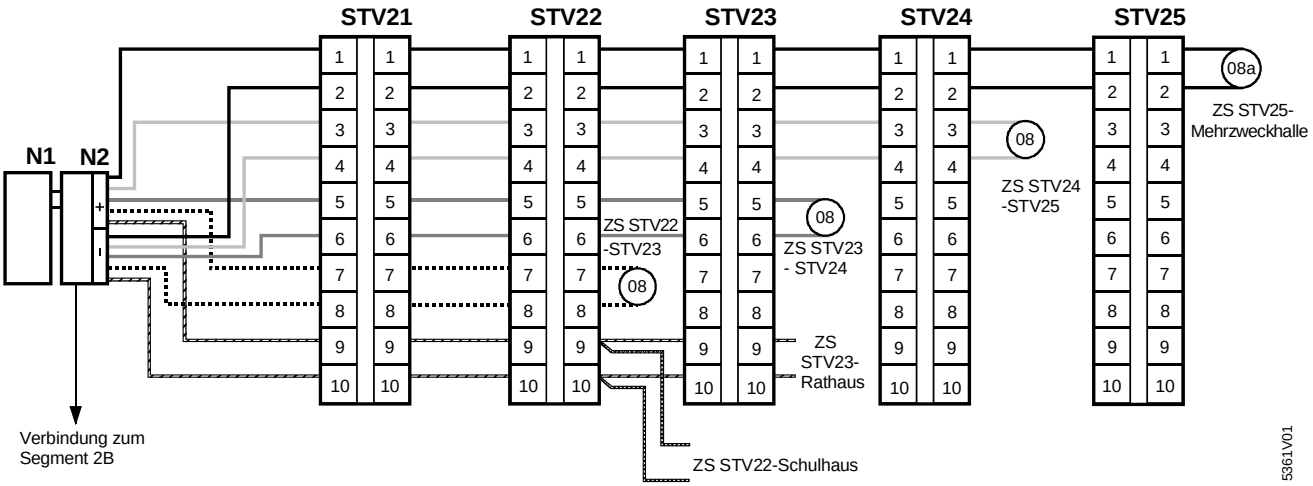
List of bus sections

Section	*Length*	*Meter number*	*Bus address*	*Type of cable*	*Loop resistance*			*Cable capacitance*		*Remarks*
					Type of cable	*Cable theoret.*	*Cable pract.*	*Type of cable*	*Cable theoret.*	
1.a	120 m	5	1–5	J-Y(St)Y 4 × 2 × 0.8	36 Ω/km	4.32 Ω	4.2 Ω	100 nF/km	36 nF	2 pairs combined
1.b	100 m	7	6–12	J-Y(St)Y 2 × 2 × 1.5	24 Ω/km	2.4 Ω	2.4 Ω	120 nF/km	15 nF	
1.c	250 m	3	20, 22, 24	J-Y(St)Y 2 × 2 × 0.8	71 Ω/km	17.75 Ω	17.3 Ω	100 nF/km	37.5 nF	
…										
…										
…										

List of devices

Address	*Segment*	*Bus address*	*Type of device*	*Device number*	*Customer number*	*Medium*
Woetzing 71	1.A	1	RVD230	99032827	99032827	Controller
Woetzing 71	1.A	2	2WR5	99011701	99032827	Heat
Burgstall 104	1.A	3	RVD240	99032828	99032828	Controller
Burgstall 104	1.A	4	2WR5	98121101	99032828	Heat
Burgstall 104	1.A	5	AEW21.2	98121102	99032828	Hot water
…						
…						
…						

Connection diagram



Example of a connection diagram of an M-bus plant. The cables are routed via distribution boxes (STV).

N1 M-bus central unit OZW10
N2 M-bus signal converter WZC-S250
STV… Street distribution box
ZS Meter segment

8.5 Billing file

8.5.1 Introduction

As described in subsection 2.2.3 "Function", the OZW10 stores the data of all M-bus devices read out last. They can be read out at the M-bus central unit. To handle them on a PC, they can be transferred as follows:

- The data are made available at the RS-232 port as a billing file. There, they can be read out with the help of the ACS7… PC software, either directly or via modem
- The data are transferred to a memory card in the form of a billing file. To insert the memory card, the M-bus central unit has a slot. The memory card is forwarded to the billing agency, which loads the data with the help of a second OZW10 and the ACS7… PC software directly to the PC via the RS-232.

The following subsections describe the contents of the billing file.

8.5.2 Description

The billing file of the OZW10 consists of 2 parts:

- Part 1: General data set with plant and central unit data
- Part 2: Billing data sets of the M-bus devices

The billing file is an ASCII hex file. The individual values are separated by tabs. The file can be handled with standard Editors. We recommend to use MS EXCEL.
The memory card can be read out directly with the ACS110 or ACS111 via the M-bus central unit or with the help of the ALR30 card reading unit.
For the columns of the data sets, abbreviations are used. A suffix 3-digit number refers to the respective operating line of the M-bus central unit.

Example

KFabNr354 means that the serial number of the M-bus central unit can be found on card no. 3, operating line 54.
Using an MS EXCEL macro, the billing file can be rearranged as required (e.g. clear text for columns). In that case, the original version of the file must be saved!

8.5.3 Example of a billing file

File	KKundeNr301	KFabNr354	KSWInd352	ZDat305	ZWt306	ZUhr306	CBS304	SFehler350	ZDatEvent	ZUhrEvent	CMBusDev347	Type
OZW_001.BIL	0	374	4.0	02.11.1995	4	12:58:34	27	0	x x x	x x x	3	OZW10
Device	SMBusDev	ZDatR133	ZUhrR134	KDevAdr292	KKundeNr101	KFabNr254	KCoCode282	KSWIndD252	KMed187	ZDat	ZUhr	CBS104
	1	1	02.11.1995	09:35:00	1	1000000	127	58416	2	4	31.12.1999	23:59:00	0
	2	1	02.11.1995	09:35:00	0	2000000	32767	58416	3	4	31.12.1999	23:59:00	546
	3	1	02.11.1995	09:35:00	01-01.003	3000000	8388607	58416	3	4	31.12.1999	23:59:00	999999
	SFehler250	ZDatEvent	ZUhrEvent	ZFDauer251	CEnKVal102	CEnKDim102	CVolKVal103	CVolKDim103	CEnStLVal107	CEnStLDim107	CVolStLVal108	CVolStLDim108
		0	x x x	x x x	0	127	kWh	1.27	m3	127	kWh	127	kWh
		42	02.11.1995	10:05:00	546	32767	kWh	327.67	l	32767	kWh	32767	kWh
		0	x x x	x x x	0	8388607	kWh	83886.07	ml	8388607	kWh	8388607	kWh
	ZDatStL110	CEnStVlVal111	CEnStVlDim112	CVolStVlVal112	CVolStVlDim112	ZDatStVl114	CPQMwMaxVal169	CPQMwMaxDim169	ZDatMwMax170	CVxTar1Val193	CVxTar1Dim193	CVxTar2Val194
		31.12.1999	127	kWh	127	kWh	31.12.1999	1.27	kW	31.12.1999	127	kWh	0
		31.12.1999	32767	kWh	32767	kWh	31.12.1999	327.67	l	31.12.1999	32767	kWh	0
		31.12.1999	8388607	kWh	8388607	kWh	31.12.1999	83886.07	W	31.12.1999	8388607	kWh	0
	CVxTar2Dim194	CVxTar1StLVal193	CVxTar1StLDim193	CVxTar2StLVal194	CVxTar2StLDim194								
	kWh	127	kWh	0	kWh								
	kWh	32767	kWh	0	kWh								
	kWh	8388607	kWh	0	kWh								

5361T01

8.5.4 Abbreviations

Full name	*Name in the file*	*Presentation*
File name	File	OZW_XXX.BIL (XXX=001…999)
Plant number	KKundeNr301	Max. 8 digits
Production number	KFabNr354	Max. 8 digits
Software version	KSWInd352	Version, revision, max. 2 digits each
Date	ZDat305	DD.MM.YY
Weekday	ZWt306	1…7 (Monday…Sunday)
Time of day	ZUhr306	hh.mm.ss
Operating hours	CBS304	h, max. 6 digits
Fault	SFehler350	2 digits
Date fault	ZDatEvent	DD.MM.YY
Time of day fault	ZUhrEvent	hh.mm.ss (ss=00)
Number of M-bus devices	CMBusDev347	Max. 3 digits
Device type	Type	'OZW10'
Device number	Device	Max. 3 digits (0…750)
Device state	SMBusDev	0 = not present 1 = ok 2 = busy 3 = WSD readings exceeded 4 = communication error 5 = removed
Reading date	ZDatR133	DD.MM.YY
Reading time	ZUhrR134	hh.mm.ss (ss=00)
M-bus address	KDevAdr292	M-bus: max. 3 digits (0…250) Siemeca™ AMR: nn-ss.aaa
Customer number	KKundeNr101	Max. 8 digits
Production number	KFabNr254	Max. 8 digits
Manufacturer's code	KCoCode282	Max. 5 digits
Software version	KSWIndD252	Max. 3 digits (0…255)
Medium	KMed187	Max. 2 digits (0…99)
Date device	ZDatD	DD.MM.YY
Time of day device	ZUhrD	hh.mm.ss (ss=00)
Operating hours	CBS104	h, max. 6 digits
Fault	SFehler250	Max. 2 digits
Date fault	ZDatEvent	DD.MM.YY
Time of day fault	ZUhrEvent	hh.mm.ss (ss=00)
Duration of fault	ZFDauer251	h, max. 6 digits
Cumulated energy value	CEnKVal102	Max. 8 digits
Cumulated energy reading	CEnKDim102	Decimal points and symbol if used
Cumulated volume value	CVolKVal103	Max. 8 digits
Cumulated volume reading	CVolKDim103	Decimal points and symbol if used
Energy last set day value	CEnStLVal107	Max. 8 digits
Energy last set day reading	CEnStLDim107	Decimal points and symbol if used
Volume last set day value	CVolStLVal108	Max. 8 digits
Volume last set day reading	CVolStLDim108	Decimal points and symbol if used
Date last set day	ZDatStL110	DD.MM.YY
Energy last but one set day value	CenStVlVal111	Max. 8 digits
Energy last but one set day reading	CenStVlDim111	Decimal points and symbol if used
Volume last but one set day value	CvolStVlVal112	Max. 8 digits
Volume last but one set day reading	CvolStVlDim112	Decimal points and symbol if used
Date last but one set day	ZdatStVl114	DD.MM.YY
MV power / flow rate max. value	CPQMwMaxVal169	Max. 8 digits
MV power / flow rate max. reading	CPQMwMaxDim169	Decimal points and symbol if used
MV power / flow rate max. date	ZdatMwMax170	DD.MM.YY
Energy / volume tariff 1 value	CvxTar1Val193	Max. 8 digits
Energy / volume tariff 1 reading	CvxTar1Dim193	Decimal points and symbol if used
Energy / volume tariff 2 value	CvxTar2Val194	Max. 8 digits
Energy / volume tariff 2 reading	CvxTar2Dim194	Decimal points and symbol if used

Full name	*Name in the file*	*Presentation*
Tariff 1 last set day (energy / volume, value)	CvxTar1StLVal193	Max. 8 digits
Tariff 1 last set day (energy / volume, unit)	CvxTar1StLDim193	Decimal points and symbol if used
Tariff 2 last set day (energy / volume, value)	CvxTar2StLVal194	Max. 8 digits
Tariff 2 last set day (energy / volume, unit)	CvxTar2StLDim194	Decimal points and symbol if used

Special marking of values:
x x x Value invalid (value not generated)
– – – Value invalid (function inactive)
~ ~ ~ Value invalid (value from remote device not received)
Value not available

8.5.5 Data of M-bus devices stored in the billing file

The OZW10 stores the following data in the billing file:

Type of device	*Cumul. values*	*Set day values*	*Monthly values*	*Tariff values*	*Maximum values*	*Measured values*	*Error state*
SONOHEAT®	E + V	E + V	–	E	L + V + T_R + T_V	L + V + T_R + T_V	Yes
SONOGYR® energy	E + V	2 times E + V	13 times E / V	2 times E / V	L + D	L + D + T_R + T_V	Yes
SONOGYR® WSD	E + V	E + V	–	2 times E / V	L / D	L + D + T_R + T_V	Yes
MEGATRON®2 (M-bus)	E + V	E + V	15 times E / V	E / V	–	L + D + T_R + T_V	Yes
AEW21.2	E / V	E / V	–	–	–	–	Yes
Relay PadpulsM1	E / V	–	–	–	–	–	Yes
MEMOTRON®2 WHE21	H	H	–	–	–	–	Yes
MEGATRON®2 WZ (Siemeca™ AMR)	E + V	E + V	13 times E / V	–	–	–	Yes
MEGATRON®2 K/WZ (Siemeca™ AMR)	E	E + K	13 times E / K	K	–	–	Yes
VOLUTRON®2 (Siemeca™ AMR)	V	V	13 times V	–	–	–	Yes
MEMOTRON®2 WHE26 (Siemeca™ AMR)	H	H	13 times H	–	–	–	Yes
AEW36.2 (Siemeca™ AMR)	E / V	E / V	13 times E / V	–	–	–	Yes

D Flow rate
E Energy
H Heat cost units
K Cooling energy
L Power
T_R Return temperature
T_V Flow temperature
V Volume
WZ Heat meter
K/WZ Cooling energy / heat meter
+ And
/ Or

The information given above applies to the latest version of the OZW10. With predecessor versions, not all data are necessarily available.

8.6 Data of M-bus devices available on ACS7…

ACS7… supports far more than 100 devices and versions with own device descriptions. The list of supported devices is constantly updated. In this document, it is not possible to give all information about the available data of the M-bus device. Information about the individual types of devices and versions can be provided on request.

8.7 Error messages from M-bus devices and alarm messages delivered by the OZW…

The following sections describe the generation of alarm messages by the central units:

- OZW10: 2.2.3 "Function"
- OZW111: 2.3.3 "Function"

The central units signal errors based on error codes 01 through 99. Each M-bus device has its own error codes or error displays which are mapped on the error codes of the central unit, depending on the type of device. The following sections describe how the errors of the M-bus devices are mapped on those of the central unit. The information given applies to the OZW10 of V4.0 or higher and the OZW111.

8.7.1 Heat meters SONOHEAT® 2WR4 / 2WR5

Error code central unit		*Error text*	
04	Error flow acquisition, sensor error	F0	Flow cannot be measured: Air in the measuring section / pipe, vent pipe (as supplied)
		F1	Open-circuit flow sensor
		F2	Open-circuit return sensor
		F5	Short-circuit flow sensor
		F6	Short-circuit return sensor
		F9	ASIC error
34	Communication breakdown M-bus	---	Current error of device not available
47	Severe error, sensor error, electronics error	F3	Electronics for temperature evaluation faulty
		F4	Battery exhausted, replace
		F7	Fault of internal storage operation
		F8	Error F1, F2, F5 or F6 for more than 8 hours pending, detection of fraud attempts. No more measurements made

8.7.2 Heat meters SONOGYR® energy WSF, WSG, WSJ

The SONOGYR® energy heat meter shows severe errors on the display's top level "Actual". Minor errors are only displayed on the "Info" level.

Error code central unit		*Error code device*	
02	Undervoltage	F:2	Undervoltage: Check mains voltage or replace battery module
34	Communication breakdown M-bus	---	Current error of device not available
40	Severe error	F:4	Severe functional error was present
		F:43	General hardware error: Device defective
		F:64	Open-circuit flow temperature measuring circuit
		F:74	Short-circuit flow temperature measuring circuit

Error code central unit	*Error code device*
	F:84 Open-circuit return temperature measuring circuit F:94 Short-circuit return temperature measuring circuit F:E4 Wrong power supply module for the selected application
42 Severe error, undervoltage	F:42 Undervoltage: Check mains voltage or replace battery module

8.7.3 Heat meters SONOGYR® WSD…

The SONOGYR® WSD heat meter shows pending and stored errors on the display's top level.

Error code central unit	*Error code device*
01 Tv<Tr or T outside value range	F:1 Flow temperature < Return temperature, temperature outside measuring range
02 Undervoltage	F:2 Undervoltage
03 Hardware error	F:3 Hardware error
05 Air in the measuring path	F:5 Air in the measuring path
06 Flow sensor short-circuit / open-circuit	F:6 Open-circuit flow sensor measuring circuit F:7 Short-circuit flow sensor measuring circuit
08 Return sensor short-circuit / open-circuit	F:8 Open-circuit return sensor measuring circuit F:9 Short-circuit return sensor measuring circuit
34 Communication breakdown M-bus	--- Current error of device not available
40 Severe error	F:40 Error for more than 8 minutes pending
41 Severe error, Tv<Tr or T outside value range	F:41 Flow temperature < return temperature, temperature outside measuring range, F:4 for more than 8 minutes pending
42 Severe error, undervoltage	F:42 Undervoltage, F:2 for more than 8 minutes pending
43 Severe error, hardware error	F:43 Hardware error, F:3 for more than 8 minutes pending
45 Severe error, air in measuring path	F:45 Air in measuring path, F:5 for more than 8 minutes pending
46 Severe error, flow sensor short-circuit / open-circuit	F:46 Open-circuit flow sensor measuring circuit, F:6 for more than 8 minutes pending F:47 Short-circuit flow sensor measuring circuit, F:7 for more than 8 minutes pending
48 Severe error, return sensor short-circuit / open circuit	F:48 Open-circuit return sensor measuring circuit, F:8 for more than 8 minutes pending F:49 Short-circuit return sensor measuring circuit, F:9 for more than 8 minutes pending
93 Number of readouts exceeded	--- No display of error on the device

8.7.4 Heat meters MEGATRON®2 WFM / N / Q / R21… (M-bus)

The MEGATRON®2 heat meter shows severe errors on the display's top level "Actual". Minor errors are only displayed on the "Info" level.

Error code central unit		*Error code device*	
02	Undervoltage	F:2	Undervoltage battery
34	Communication breakdown M-bus	---	Current error of device not available
40	Severe error	F:4	Severe function error was pending
		F:43	General hardware error: Device defective
		F:64	Open-circuit flow temperature measuring circuit
		F:74	Short-circuit flow temperature measuring circuit
		F:84	Open-circuit return temperature measuring circuit
		F:94	Short-circuit return temperature measuring circuit
42	Severe error, undervoltage	F:42	Undervoltage battery

8.7.5 Water meters VOLURON®2 WFH / C21… (M-bus)

The VOLUTRON®2 water meter shows severe errors on the display's top level "Actual". Minor errors are only displayed on the "Info" level.

Error code central unit		*Error code device*	
02	Undervoltage	F:2	Undervoltage battery
34	Communication breakdown M-bus	---	Current error of device not available
40	Severe error	F:4	Severe function error was pending
		F:43	General hardware error: Device defective
42	Severe error, undervoltage	F:42	Undervoltage battery

8.7.6 Pulse adapter AEW21.2

The AEW21.2 pulse adapter has no (error) display.

Error code central unit		*Error device*	
02	Undervoltage	---	Undervoltage battery
34	Communication breakdown, M-bus	---	Current error of device not available
40	Severe error	---	Hardware error, sabotage contact or error detection on pulse interface (Namur)
42	Severe error, undervoltage	---	Hardware error, sabotage contact or error detection on pulse interface (Namur) and undervoltage battery

8.7.7 Pulse adapter Relay PadpulsM1

The PadPulsM1 pulse adapter has no (error) display.

Error code central unit		*Error device*	
09	Device-specific error	---	Write protection set (no error)
34	Communication breakdown M-bus	---	Current error of device not available

8.7.8 Heat cost allocator MEMOTRON®2 WHE21

In the event of fault, the WHE21 heat cost allocator displays Error.

Error code central unit		*Error device*	
02	Undervoltage	Error	Undervoltage battery
34	Communication breakdown M-bus	---	Current error of device not available
40	Severe error	Error	Hardware error or sabotage contact
42	Severe error, undervoltage	Error	Hardware error or sabotage contact and undervoltage battery

8.7.9 District heating controllers SIGMAGYR® RVD2…

The RVD2… district heating controllers display Error on line 50 with the respective error code.

Error code central unit		*Error code device*	
34	Communication breakdown M-bus	---	Current error of device not available
61	Fatale plant error	030	Error flow sensor B1
		032	Error flow sensor 2 B12
		050	Error DHW sensor B31
		052	Error DHW sensor B32
		054	Error DHW flow sensor B3
62	External alarm	171	Alarm contact
63	Plant error	010	Error outside sensor B9
		040	Error return sensor (primary) B7
		042	Error differential / return sensor B71
		043	Error differential / return sensor B72
64	Interruption of connection	180	Connection to heat meter interrupted
65	Communication error	061	Fault room unit 1
		066	Fault room unit 2
		081	Short-circuit LPB
		086	Short-circuit PPS
66	Continuous control deviation	120	Flow alarm precontrol
		121	Flow alarm heating circuit 1
		122	Flow alarm heating circuit 2
		123	Flow alarm DHW
67	Fault subsystem	Error message from some other controller in the interconnected system:	
		010	Error outside sensor B9
		030	Error flow sensor B1
		032	Error return sensor 2 B12
		040	Error return sensor (primary) B7
		042	Error differential / return sensor B71
		043	Error differential / return sensor B72
		050	Error DHW sensor B31
		052	Error DHW sensor B32
		054	Error DHW flow sensor B3
		061	Fault room unit 1
		066	Fault room unit 2
		081	Short-circuit LPB
		086	Short-circuit PPS
		120	Flow alarm precontrol
		121	Flow alarm heating circuit 1

Error code central unit	*Error code device*
	122 Flow alarm heating circuit 2 123 Flow alarm DHW 171 Alarm contact 180 Connection to heat meter interrupted For other errors, refer to the device description of the relevant controller

8.7.10 District heating controller SIGMAGYR® RVP97

The RVP97 district heating controller does not display general errors. Sensor errors are assigned directly to the relevant sensor values. Error codes are made available via the ACT97 tool.

Error code central unit	*Error code ACT97*
34 Communication breakdown M-bus	--- No error on the device
62 External alarm	0 Controller fault
65 Communication fault	9 Error load management telegram
66 Continuous control deviation	2 Flow temperature heating circuit too high 3 DHW temperature too high 4 Return temperature heating circuit too high 5 Return temperature DHW too high 6 Differential heating circuit too great 7 Differential DHW too great 8 Pulse exceeded
71 Alarm input 1	1 Common contact

8.7.11 Third-party devices (devices unknown to the OZW10)

For evaluation of errors from other devices (devices the central unit does not know), the M-bus status byte is evaluated. Coding of the M-bus status byte must be taken from the relevant device description.

Error code central unit	*M-bus status byte (x=don't care)*	
02 Undervoltage	xxxx01xxb	See device description
09 Device-specific error	gggx00xxb (ggg≠000)	See device description
34 Communication breakdown M-bus	---	Current error of device not available
40 Severe error	000x10xxb	See device description
42 Severe error, undervoltage	xxxx11xxb	See device description
49 Severe error, device-specific error	gggx10xxb (ggg≠000)	See device description

8.7.12 Siemeca™ AMR devices

The WTX16 or WTT16 radio nodes map the errors of the meters on common error messages. Depending on the type of meter, the errors can have different causes and displays.

Radio nodes WTX16 and WTT16

Error code central unit	*Error code device*
02 Undervoltage	EA21 Main battery too weak EA22 Backup battery too weak
07 Error operating conditions	EA20 Parameter outside tolerances EA30 Tolerance error of some other system device EA31 Primary address conflict (address assigned twice) EA34 Clock tolerance between 2 network nodes too high
10 Communication error subsystem	Eb4x Communication to x radio nodes temporarily interrupted EC4x Communication to x meters temporarily interrupted
34 Communication breakdown M-bus	--- Current error of device not available
43 Severe error, hardware error 42*, 49*	EA10 Undefined device error EA11 Hardware error
50 Severe error, communication breakdown subsystem 42*	Eb4x Communication to x radio node continuously interrupted EC4x Communication to x measuring instruments interrupted

* With OZW10 V4.0, these error codes are produced by mistake

MEGATRON®2 WFM / WMM / WFQ / WFN / WFR / WMN (radio 868 MHz), VOLUTRON®2 WFH / WMH / WFC/ WMC (radio 868 MHz)

Error code central unit	*Error code device*
02 Undervoltage	F:2 Undervoltage battery
07 Error operating conditions 02*, 05*, 06*	F:64 Open-circuit flow temperature measuring circuit F:74 Short-circuit flow temperature measuring circuit F:84 Open-circuit return temperature measuring circuit F:94 Short-circuit return temperature measuring circuit
10 Communication error subsystem 01*	--- Temporary communication breakdown between radio node on the M-bus and meter
34 Communication breakdown M-bus	--- Current error of device not available
43 Severe error, hardware error 42*, 49*	F:4 Severe functional error was pending F:43 General hardware error: Device defective
50 Severe error, communication breakdown subsystem 41*, 42*, 45*	--- Continuous communication breakdown between radio node on M-bus and meter

* With OZW10 V4.0, these error codes are produced by mistake

MEMOTRON®2 WHE26

Error code central unit	*Error code device*
02 Undervoltage	Error Undervoltage battery
10 Communication error subsystem 01*	--- Temporary communication breakdown between radio node on the M-bus and meter
34 Communication breakdown M-bus	--- Current error of device not available
43 Severe error, hardware error 42* 49*	Error Hardware error or sabotage contact

Error code central unit	*Error code device*
50 Severe error, communication breakdown subsystem 41*, 42*, 45*	Error Continuous communication breakdown between radio node on the M-bus and meter

* With OZW10 V4.0, these error codes are produced by mistake

AEW36.2

Error code central unit	*Error code device*
02 Undervoltage	F2 Operating time has elapsed FB Maximum number of communications via IrDA exceeded FC Maximum number of communications via M-bus exceeded FE Maximum number of communications via IrDA exceeded
10 Communication error subsystem 01*	--- Temporary communication breakdown between radio node on M-bus and meter
34 Communication breakdown M-bus	--- Current error of device not available
43 Severe error, hardware error 42*, 49*	F3 Hardware error F4 Error stored in nonvolatile memory F6 Pulse acquisition channel 1 open-circuit F7 Pulse acquisition channel 1 short-circuit F8 Pulse acquisition channel 2 open-circuit F9 Pulse acquisition channel 2 short-circuit
50 Severe error, communication breakdown subsystem 41*, 42*, 45*	--- Permanent communication breakdown between radio node on the M-bus and meter

***** With OZW10 V4.0, these error codes are produced by mistake

8.7.13 M-bus central unit OZW10

The OZW10 shows its own errors on popcard 3, line 50.

Error code central unit	
12	Data loss in RAM: Loss of all stored device data of the M-bus devices. A new search run must be started.
13	Data loss in EEPROM: Loss of all setting values of the central unit. Make settings again.
22	Battery of memory card exhausted: Replace battery.
23	Battery of central unit exhausted: Return central unit for repair.
35	Error memory card: Replace memory card.
36	Format error memory card: Format memory card again.
37	Memory card write protected: Remove write protection.
38	Memory card full: Use other memory card, delete files or format memory card.
71	Alarm input 1
72	Alarm input 2
73	Alarm input 3

Error code central unit	
74	Alarm input 4
92	Wrong number of meters set: During a device search run, fewer devices than the number set have responded. Check setting. Check bus connections of the M-bus devices and their settings. Check M-bus cable.
97	List of meters full: A maximum of 750 M-bus devices can be connected to the central unit. Delete the device list prior to making the search run. If the error keeps recurring, the plant requires additional central units.
98	Data storage full: There is not enough storage space to store the data of all M-bus devices. Delete the device list prior to making the search run. If the error keeps recurring, the plant requires additional central units.

8.7.14 M-bus central unit OZW111

The OZW111 has an LED for indicating errors.

Error code central unit	
17	Bus power failure: Hardware defect of the central unit. Replace it.
71	Alarm input 1
72	Alarm input 2

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Revision history

The following changes have been made against edition 2.0:

Section / subsection	*Change*
2.1.4	New screenshots for Alarm and System report
2.1.9	Table “Device-specific credit” actualized
2.1.9	Table “PC hardware” actualized
2.1.10	CMD.01 replaced by CMD.02
2.1.10	Terminology actualized
8.5.4	CPQMwMaxVal169: “value“ added

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